

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-229273

(43)Date of publication of application : 15.08.2003

(51)Int.Cl.

H05B 33/14  
C09K 11/06  
H05B 33/22

(21)Application number : 2002-025736

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(22)Date of filing : 01.02.2002

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## (54) ORGANIC ELECTRIC-FIELD LIGHT EMITTING ELEMENT

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide an organic electric-field light emitting element having a high brightness, a long light emitting life, and excellent durability.

SOLUTION: At least one layer containing hydrocarbon compound composed by directly bonding an anthracene ring and a fluorene ring, and hydrocarbon compound having substituted amino group, is held between a pair of electrode base plates.

## LEGAL STATUS

[Date of request for examination]

05.07.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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## CLAIMS

[Claim(s)]

[Claim 1] Organic electroluminescence devices which come at least to pinch the layer containing the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly among one pair of electrode substrates, and the hydrocarbon compound which has an amino substituent further.

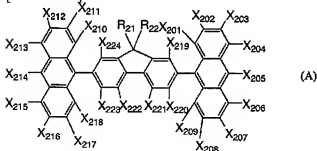
[Claim 2] Organic electroluminescence devices according to claim 1 whose hydrocarbon compound which the anthracene ring and the fluorene ring couple directly is a hydrocarbon compound expressed with a general formula (1).

$X1-(F1)j-(A1)k-(F2)l-(A2)m-(F3)n-X2$  (1)

A1 and A2 express independently the anthracene diyl radical which is not permuted [ a permutation or ] among [type, respectively. F1, F2, and F3 express independently the fluorene diyl radical which is not permuted [ a permutation or ], respectively. Independently X1 and X2, respectively A hydrogen atom, a halogen atom, a straight chain, The aryl group which is not permuted [ branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or ], or the aralkyl radical which is not permuted [ a permutation or ] is expressed, j, m, and n express 0 or 1, and k and l express 1 or 2, when K is 2, A1 may be the same or you may differ, and when l is 2, F2 may be the same or they may differ -- ]

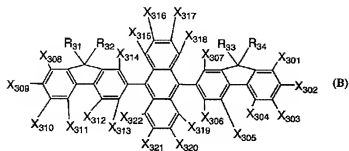
[Claim 3] Organic electroluminescence devices according to claim 2 which are the compounds with which the hydrocarbon compound expressed with a general formula (1) is chosen from a general formula (A), (\*\* 1), a general formula (B) (\*\* 2) and a general formula (C), and (\*\* 3).

[Formula 1]



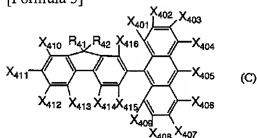
The inside R21 and R22 of [type independently, respectively A hydrogen atom, a straight chain, branching, or an annular alkyl group, The aralkyl radical which is not permuted [ the aryl group which is not permuted / a permutation or /, a permutation, or ] is expressed. Independently X210-X224, respectively A hydrogen atom, a halogen atom, a straight chain, \*\* showing the aryl group which is not permuted [ branching or an annular alkyl group, a straight chain branching, an annular alkoxy group, a permutation, or ], R21 and R22, and X210-X224 are not an anthryl radical and a fluorenyl group -- ]

[Formula 2]



R31-R34 express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] among [type, respectively, and X301-X322 express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular-like alkyl group, a straight chain, branching, an annular alkoxy group, a permutation, or ], respectively. \*\*\*\* R31-R34, and X301-X322 are] which is not an anthryl radical and a fluorenyl group.

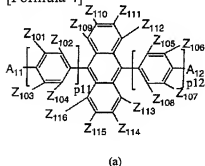
[Formula 3]



R41 and R42 express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branched chain or an annular alkyl group, a permutation, or /, a permutation, or ] among [type, respectively, and X401-X416 express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group, a permutation, or ], respectively. \*\*\*\* R41 and R42, and X401-X416 are] which is not an anthryl radical and a fluorenyl group.

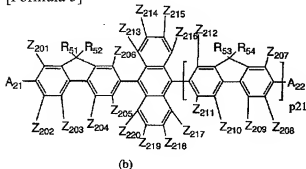
[Claim 4] Organic electroluminescence devices according to claim 1 to 3 which are the compounds with which the hydrocarbon compound which has an amino substituent is chosen from following general formula (a), (\*\* 4), general formula (b) (\*\* 5) or general formula (c), and (\*\* 6).

[Formula 4]



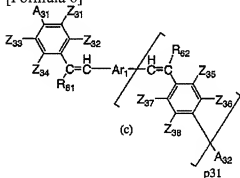
A11 and A12 among [type The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A11 or A12 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z101-Z116, respectively A hydrogen atom, a halogen atom, a straight chain, expressing the aralkyl radical which is not permuted [ the

arylthio radical which is not permuted / the aryloxy group which is not permuted / the aryl group which is not permuted / branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or /, p11 and p12 express 0 or 1 -- ]  
[Formula 5]



A21 and A22 among [type The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A21 or A22 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z201-Z220, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, It is] to which the aryl group which is not permuted [ a permutation or ] is expressed, R51-R54 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ], and p21 expresses 0 or 1.

[Formula 6]



A31 and A32 among [type The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A31 or A32 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z31-Z38, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, The aryloxy group which is not permuted [ the aryl group which is not permuted / a permutation or /, a permutation, or ], expressing the aralkyl radical which is not permuted [ the arylthio radical which is not permuted / a permutation or /, a permutation, or ], Ar1 expresses a divalent aromatic series radical, R61 and R62 express the aryl group which is not permuted [ a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ], and p31 expresses 0 or 1 -- ]

[Claim 5] Organic electroluminescence devices according to claim 1 to 4 whose layer containing the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent is a luminous layer.

[Claim 6] Organic electroluminescence devices according to claim 1 to 5 whose weight ratios of the

hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent are 10:1-100:1.

[Claim 7] Organic electroluminescence devices according to claim 1 to 6 which have a hole-injection transporting bed further in inter-electrode [ one pair of ] [claim 8] Organic electroluminescence devices according to claim 1 to 7 which have an electron injection transporting bed further in inter-electrode [ one pair of ].

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to organic electroluminescence devices.

[0002]

[Description of the Prior Art] Conventionally, although inorganic electroluminescence devices have been used as the panel mold light sources, such as a back light, in order to make this light emitting device drive, the high tension of an alternating current is required for them. Recently came and the organic electroluminescence devices (an organic electroluminescent element: organic EL device) which used the organic material for luminescent material were developed [Appl.Phys.Lett., 51,913 (1987)]. Organic electroluminescence devices are components which emit light using the light which has the structure pinched between an anode plate and cathode in the thin film containing the compound which has a luminescence function, injects an electron and an electron hole (hole) into this thin film, and is emitted in case an exciton (exciton) is made to generate and this exciton deactivates by making it recombine. organic electroluminescence devices -- severalV--dozens -- it is the low battery of about V direct current, and luminescence of various colors (for example, red, blue, green) is possible by being able to emit light and choosing the class of fluorescence organic compound. As for the organic electroluminescence devices which have such a description, the application to various light emitting devices, a display device, etc. is expected. However, generally, luminescence brightness is low and is not enough practically.

[0003] [J. as which the organic electroluminescence devices which used for example, tris (8-quinolate) aluminum as a luminous layer, and used the host compound, the coumarin derivative, and the pyran derivative as a guest compound (dopant) are proposed as an approach of raising luminescence brightness Appl.Phys., 65, 3610(1989)]. Moreover, organic electroluminescence devices using the anthracene derivative as an ingredient of a luminous layer are proposed (JP,8-12600,A, JP,11-111458,A). Moreover, organic electroluminescence devices using the anthracene derivative as a guest compound of a luminous layer are proposed (JP,10-36832,A, JP,10-294179,A).

[0004] However, these light emitting devices are also hard to be referred to as having sufficient luminescence brightness and a luminescence life.

[0005] Moreover, approach [j.chem.phys which obtains blue - purple-blue luminescence using for example, an anthracene crystal as a component .. The approach [thin Solid Films, 99,171 (1982)] of carrying out thin film formation with a vacuum deposition method, and using 44.2902(1966)] and a condensed multi-ring aromatic compound, the approach (JP,3-231970,A) of forming a luminous layer using an aromatic series dimethylidene compound, the approach (JP,5-17765,A) of forming a luminous layer using the aromatic series dimethylidene compound which has an amino substituent, etc. are reported. However, the organic electroluminescence devices using these approaches are also hard to be referred to as still having sufficient luminescence brightness and a luminescence life. In current, high brightness and organic electroluminescence devices which emit light long lasting are desired further.

[0006]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is excellently in luminous efficiency and offering high brightness and the organic electroluminescence devices which emit light long lasting.

[0007]

[Means for Solving the Problem] this invention person etc. came to complete this invention, as a result of examining organic electroluminescence devices wholeheartedly. That is, this invention is organic electroluminescence devices which come at least to pinch the layer containing the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly between \*\* 1 pair electrode substrates, and the hydrocarbon compound which has an amino substituent further.

\*\* Organic electroluminescence devices given in \*\* the given hydrocarbon compound which the anthracene ring and the fluorene ring couple directly is a hydrocarbon compound expressed with a general formula (1).

[0008]

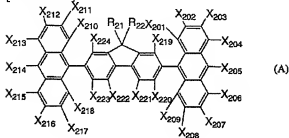
X1-(F1)j-(A1)k-(F2)l-(A2)m-(F3)n-X2 (1)

A1 and A2 express independently the anthracene diyl radical which is not permuted [ a permutation or ] among [type, respectively. F1, F2, and F3 express independently the fluorene diyl radical which is not permuted [ a permutation or ], respectively. Independently X1 and X2, respectively A hydrogen atom, a halogen atom, a straight chain, The aryl group which is not permuted [ branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or ], or the aralkyl radical which is not permuted [ a permutation or ] is expressed, j, m, and n express 0 or 1, and k and l express 1 or 2, when K is 2, A1 may be the same or you may differ, and when l is 2, F2 may be the same or they may differ -- ]

[0009] \*\* Organic electroluminescence devices given in \*\* which is the compound with which the hydrocarbon compound expressed with a general formula (1) is chosen from a general formula (A), (\*\* 7), a general formula (B) (\*\* 8) and a general formula (C), and (\*\* 9).

[0010]

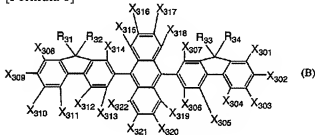
[Formula 7]



[0011] The inside R21 and R22 of [type independently, respectively A hydrogen atom, a straight chain, branching, or an annular alkyl group, The aralkyl radical which is not permuted [ the aryl group which is not permuted / a permutation or /, a permutation, or ] is expressed. Independently X210-X224, respectively A hydrogen atom, a halogen atom, a straight chain, \*\* showing the aryl group which is not permuted [ branching or an annular alkyl group, a straight chain branching, an annular alkoxy group, a permutation, or ], R21 and R22, and X210-X224 are not an anthryl radical and a fluorenyl group -- ]

[0012]

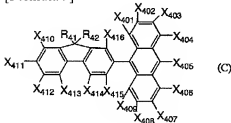
[Formula 8]



[0013] R31-R34 express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] among [type, respectively, and X301-X322 express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular-like alkyl group, a straight chain, branching, an annular alkoxy group, a permutation, or ], respectively. \*\*\*\* R31-R34, and X301-X322 are] which is not an anthryl radical and a fluorenyl group.

[0014]

[Formula 9]



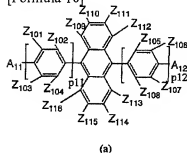
[0015] R41 and R42 express independently the aralkyl radical which is not permuted [ the aryl group which is not

permuted / a hydrogen atom, a straight chain, branched chain or an annular alkyl group, a permutation, or /, a permutation, or ] among [type, respectively, and X401-X416 express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group, a permutation, or ], respectively. \*\*\*\* R41 and R42, and X401-X416 are] which is not an anthryl radical and a fluorenyl group.

[0016] \*\* Organic electroluminescence devices given in either of \*\*s thru/ or \*\*s which is the compound with which the hydrocarbon compound which has an amino substituent is chosen from following general formula (a), (\*\* 10), general formula (b) (\*\* 11) or general formula (c), and (\*\* 12).

[0017]

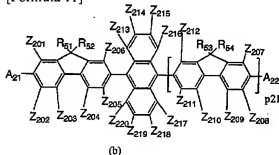
[Formula 10]



[0018] A11 and A12 among [type The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A11 or A12 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z101-Z116, respectively A hydrogen atom, a halogen atom, a straight chain, expressing the aralkyl radical which is not permuted [ the arylthio radical which is not permuted / the aryloxy group which is not permuted / the aryl group which is not permuted / branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or ], p11 and p12 express 0 or 1 -- ]

[0019]

[Formula 11]

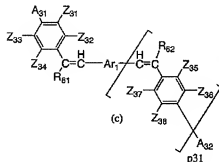


[0020] A21 and A22 among [type The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A21 or A22 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z201-Z220, respectively A hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, It is] to which the aryl group which is not permuted [ a permutation or ] is expressed, R51-R54 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ], and p21 expresses 0 or 1.

[0021]

[Formula 12]





[0022] A31 and A32 among [type The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A31 or A32 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z31-Z38, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, The aryloxy group which is not permuted [ the aryl group which is not permuted / a permutation or /, a permutation, or ], expressing the aralkyl radical which is not permuted [ the arylthio radical which is not permuted / a permutation or /, a permutation, or ], Ar1 expresses a divalent aromatic series radical, R61 and R62 express the aryl group which is not permuted [ a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ], and p31 expresses 0 or 1 -- ]

[0023] \*\* Organic electroluminescence devices given in either \*\* whose layer containing the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent is a luminous layer thru/or \*\*.

\*\* Organic electroluminescence devices given in either \*\* whose weight ratios of the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent are 10:1-100:1 thru/or \*\*.

\*\* Organic electroluminescence devices given in either claim \*\* which has an electron injection transporting bed further in inter-electrode [ given in either \*\* which has a hole-injection transporting bed further in inter-electrode / one pair of / thru/or \*\* / organic electroluminescence-devices \*\* 1 pair ] thru/or \*\*.

[0024]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail.

[0025] This invention relates to the organic electroluminescence devices which come at least to pinch the layer containing the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly among one pair of electrode substrates, and the hydrocarbon compound which has an amino substituent further.

[0026] The hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly is a with a molecular weight of 2000 or less compound preferably excluding a polymer, and is a with a molecular weight of 1000 or less compound more preferably.

[0027] A fluorene ring is the compound combined with the anthracene ring the 9th place in the location of an except preferably, and the hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly is a compound expressed with a general formula (1) more preferably.

[0028]

X1-(F1)j-(A1)k-(F2)l-(A2)m-(F3)n-X2 (1)

(A1 and A2 express independently the anthracene diyl radical which is not permuted [ a permutation or ] among a formula, respectively.) F1, F2, and F3 express independently the fluorene diyl radical which is not permuted [ a permutation or ], respectively. Independently X1 and X2, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, The aryl group which is not permuted [ a permutation or ], a permutation, or a non-permuted aralkyl radical is expressed. j, m, and n express 0 or 1, and k and l express 1 or 2, when k is 2, A1 comrades may be the same or you may differ, and when l is 2, F2 comrades may be the same or may differ.

[0029] In the compound expressed with a general formula (1), X1 and X2 express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group a permutation, or ], a permutation, or a non-permuted aralkyl radical, respectively.

[0030] In addition, an aryl group expresses heterocycle type aromatic series radicals, such as carbocyclic aromatic series radicals, such as a phenyl group and a naphthyl group, a furil radical, a thienyl group, and a pyridyl radical.

[0031] moreover, the compound expressed with a general formula (1) -- setting -- the aryl group and aralkyl radical of X1

and X2 -- a substituent -- having -- \*\*\*\* -- substituents, such as a halogen atom, the straight chain of carbon numbers 1-16, branching or an annular alkyl group, a straight chain of carbon numbers 1-16, branching or an annular alkoxy group, an aryl group of carbon numbers 3-25, and an aralkyl radical of carbon numbers 5-16, -- a single permutation -- or you may many permute.

[0032] Preferably X1 and X2 A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-16, Branching or an annular alkyl group, the straight chain of carbon numbers 1-16, branching, or an annular alkoxy group, The heterocycle type aromatic series radical which is not permuted [ the permutation of the carbocyclic aromatic series radical which is not permuted / the permutation of carbon numbers 6-25, or /, and carbon numbers 3-25, or ], They are the permutation of carbon numbers 5-16, or a non-permuted aralkyl radical. Or more preferably A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-10, branching, or an annular alkyl group, The carbocyclic aromatic series radical which is not permuted [ the permutation of the straight chain of carbon numbers 1-10, branching or an annular alkoxy group, and carbon numbers 6-12, or ], They are the permutation of the heterocycle type aromatic series radical which is not permuted [ the permutation of carbon numbers 4-12, or ], or carbon numbers 7-12, or a non-permuted aralkyl radical. Still more preferably A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-8, branching, or an annular alkyl group, They are the permutation of the heterocycle type aromatic series radical which is not permuted [ the permutation of the carbocyclic aromatic series radical which is not permuted / the permutation of the straight chain of carbon numbers 1-8, branching or an annular alkoxy group, and carbon numbers 6-10, or /, and carbon numbers 4-10, or ], or carbon numbers 7-10, or a non-permuted aralkyl radical.

[0033] As an example of X1 and X2, a hydrogen atom, a fluorine atom, a chlorine atom, Halogen atoms, such as a bromine atom, a methyl group, an ethyl group, n-propyl group, An isopropyl group, n-butyl, an isobutyl radical, sec-butyl, tert-butyl, n-pentyl radical, an isopentyl radical, a neopentyl radical, A tert-pentyl radical, a cyclopentyl group, n-hexyl group, 1-methyl pentyl radical, 4-methyl-2-pentyl radical, 3, and 3-dimethyl butyl, 2-ethyl butyl, A cyclohexyl radical, n-heptyl radical, 1-methylhexyl radical, a cyclohexyl methyl group, A 4-tert-butyl cyclohexyl radical, n-heptyl radical, a cycloheptyl radical, n-octyl radical, a cyclo octyl radical, a tert-octyl radical, 1-methyl heptyl radical, 2-ethylhexyl radical, 2-propyl pentyl radical, n-nonyl radical, 2, and 2-dimethyl heptyl radical, 2, a 6-dimethyl-4-heptyl radical, 3 and 5, 5-trimethylhexyl radical, n-decyl group, n-undecyl radical, 1-methyldodecyl radical, n-dodecyl, Straight chains, such as n-tridecyl radical, 1-hexyl heptyl radical, n-tetradecyl radical, an n-pentadecyl group, n-hexadecyl radical, an n-heptadecyl radical, n-octadecyl radical, and n-eicosyl radical, branching or an annular alkyl group, [0034] A methoxy group, an ethoxy radical, n-propoxy group, an isopropoxy group, an n-butoxy radical, An iso butoxy radical, a sec-butoxy radical, an n-pentyloxy radical, a neopentyl oxy-radical, Cyclopentyloxy radical, n-hexyloxy radical, 3, and 3-dimethyl butyloxy radical, 2-ethyl butyloxy radical, a cyclohexyloxy radical, n-heptyloxy radical, n-octyloxy radical, 2-ethylhexyloxy radical, n-nonyloxy radical, An n-decyloxy radical, n-undecyloxy radical, n-dodecyloxy radical, Straight chains, such as n-tridecyl oxy-radical, n-tetradecyl oxy-radical, an n-pentadecyl oxy-radical, n-hexadecyl oxy-radical, an n-heptadecyl oxy-radical, n-octadecyloxy radical, and n-eicosyl oxy-radical, branching or an annular alkoxy group, [0035] A phenyl group, 4-methylphenyl radical, 3-methylphenyl radical, 2-methylphenyl radical, 4-ethyl phenyl group, 3-ethyl phenyl group, 2-ethyl phenyl group, A 4-n-propyl phenyl group, 4-isopropyl phenyl group, 2-isopropyl phenyl group, A 4-n-buthylphenyl radical, 4-isobutyl phenyl group, a 4-sec-buthylphenyl radical, A 2-sec-buthylphenyl radical, a 4-tert-buthylphenyl radical, A 3-tert-buthylphenyl radical, a 2-tert-buthylphenyl radical, A 4-n-pentyl phenyl group, 4-isopentyl phenyl group, a 4-neopentyl phenyl group, A 4-tert-pentyl phenyl group, a 4-n-hexyl phenyl group, 4-(2'-ethyl butyl) phenyl group, a 4-n-heptyl phenyl group, A 4-n-octyl phenyl group, 4-(2'-ethylhexyl) phenyl group, A 4-n-nonylphenyl radical, a 4-n-DESHIRU phenyl group, a 4-n-undecyl phenyl group, A 4-n-dodecyl phenyl group, a 4-n-tetradecyl phenyl group, 4-cyclohexyl phenyl group, 4-(4'-methylcyclohexyl) phenyl group, 4-(4'-tert-butyl cyclohexyl) phenyl group, 3-cyclohexyl phenyl group, 2-cyclohexyl phenyl group, 2, 3-dimethylphenyl radical, 2, 4-dimethylphenyl radical, 2, 5-dimethylphenyl radical, 2, 6-dimethylphenyl radical, 3, 4-dimethylphenyl radical, 3, 5-dimethylphenyl radical, 3 and 4, 5-trimethylphenyl radical, 2, 3, 5, a 6-tetramethyl phenyl group, 2, 4-diethyl phenyl group, 2, 6-diethyl phenyl group, 2, 5-disopropylphenyl radical, 2, 6-disopropylphenyl radical, 2, a 6-diisobutyl phenyl group, 2, a 4-G tert-buthylphenyl radical, 2, a 5-G tert-buthylphenyl radical, 4, a 6-G tert-butyl-2-methylphenyl radical, a 5-tert-butyl-2-methylphenyl radical, 4-tert-butyl -2, 6-dimethylphenyl radical, 1-naphthyl group, 2-naphthyl group, 1, 2 and 3, a 4-tetrahydro-5-naphthyl group, 1, 2 and 3, a 4-tetrahydro-6-naphthyl group, a 4-ethyl-1-naphthyl group, a 6-n-butyl-2-naphthyl group, 5-indanyl radical, [0036] 4-methoxyphenyl radical, 3-methoxyphenyl radical, 2-methoxyphenyl radical, A 4-ethoxy phenyl group, a 3-ethoxy phenyl group, a 2-ethoxy phenyl group, A 4-n-propyloxy phenyl group, a 3-n-propyloxy phenyl group, 4-isopropoxy phenyl group, 2-isopropoxy phenyl group, A 4-n-butyloxy phenyl group, 4-isobutyloxy phenyl group, A 2-sec-butyloxy phenyl group, a 4-n-pentyloxy phenyl group, 4-isopentyloxy phenyl group, 2-isopentyloxy phenyl group, A 4-neopentyl oxy-phenyl group, a 2-neopentyl oxy-phenyl group, A 4-n-hexyloxy phenyl group, a 4-(2'-ethyl butyl) oxy-phenyl group, a 4-n-heptyloxy phenyl group, a 4-n-octyloxy phenyl group, a 4-n-nonyloxy phenyl group, a 4-n-decyloxy phenyl group, 4-n-undecyl OKISHIFE A nil radical, a 4-n-dodecyloxy phenyl group, a 4-n-tetradecyl oxy-phenyl group, 4-cyclohexyloxy

phenyl group, 2-cyclohexyloxy phenyl group, 2, 3-dimethoxy phenyl group, 2, 4-dimethoxy phenyl group, 2, 5-dimethoxy phenyl group, 3, 4-dimethoxy phenyl group, 3, 5-dimethoxy phenyl group, 3, 5-diethoxy phenyl group, A 2-methoxy-4-methylphenyl radical, a 2-methoxy-5-methylphenyl radical, A 2-methyl-4-methoxyphenyl radical, a 3-methyl-4-methoxyphenyl radical, A 3-methyl-5-methoxyphenyl radical, a 2-methoxy-1-naphthyl group, A 4-methoxy-1-naphthyl group, a 4-n-butyloxy-1-naphthyl group, A 5-ethoxy-1-naphthyl group, a 6-methoxy-2-naphthyl group, a 6-ethoxy-2-naphthyl group, A 6-n-butyloxy-2-naphthyl group, a 6-n-hexyloxy-2-naphthyl group, A 7-methoxy-2-naphthyl group, a 7-n-butyloxy-2-naphthyl group, 4-phenyl phenyl group, 3-phenyl phenyl group, 2-phenyl phenyl group, 4-(4'-methylphenyl) phenyl group, 4-(3'-methylphenyl) phenyl group, 4-(4'-ethyl phenyl) phenyl group, 4-(4'-isopropyl phenyl) phenyl group, 4-(4'-tert-butylphenyl) phenyl group, 4-(4'-n-hexyl phenyl) phenyl group, 4-(4'-n-octyl phenyl) phenyl group, 4-(4'-methylphenyl) phenyl group, 4-(4'-n-butyloxy phenyl) phenyl group, 2-(2'-methoxyphenyl) phenyl group, 4-(4'-chlorophenyl) phenyl group, a 3-methyl-4-phenyl phenyl group, A 3-methoxy-4-phenyl phenyl group, a 9-phenyl-2-fluorenyl group, A 9 and 9-diphenyl-2-fluorenyl group, a 9-methyl-9-phenyl-2-fluorenyl group, A 9-ethyl-9-phenyl-2-fluorenyl group, 4-fluoro phenyl group, 3-fluoro phenyl group, 2-fluoro phenyl group, 4-chlorophenyl radical, A 3-chlorophenyl radical, 2-chlorophenyl radical, 4-BUROMO phenyl group, 2-BUROMO phenyl group, 4-trifluoromethylphenyl radical, 2, a 3-difluoro phenyl group, 2, a 4-difluoro phenyl group, 2, a 5-difluoro phenyl group, 2, a 6-difluoro phenyl group, 3, a 4-difluoro phenyl group, 3, a 5-difluoro phenyl group, 2, 3-dichlorophenyl radical, 2, 4-dichlorophenyl radical, 2, 5-dichlorophenyl radical, 3, 4-dichlorophenyl radical, 3, 5-dichlorophenyl radical, 2, 5-dibromo phenyl group, 2 and 4, 6-TORIKURORO phenyl group, A 2-fluoro-4-methylphenyl radical, a 2-fluoro-5-methylphenyl radical, A 3-fluoro-2-methylphenyl radical, a 3-fluoro-4-methylphenyl radical, A 2-methyl-4-fluoro phenyl group, a 2-methyl-5-fluoro phenyl group, A 3-methyl-4-fluoro phenyl group, a 2-chloro-4-methylphenyl radical, A 2-chloro-5-methylphenyl radical, a 2-chloro-6-methylphenyl radical, A 3-chloro-4-methylphenyl radical, a 2-methyl-3-chlorophenyl radical, A 2-methyl-4-chlorophenyl radical, a 3-methyl-4-chlorophenyl radical, 2-chloro -4, 6-dimethylphenyl radical, 2, a 4-dichloro-1-naphthyl group, 1, a 6-dichloro-2-naphthyl group, a 2-methoxy-4-fluoro phenyl group, A 3-methoxy-4-fluoro phenyl group, a 2-fluoro-4-methoxyphenyl radical, A 2-fluoro-4-ethoxy phenyl group, a 2-fluoro-6-methoxyphenyl radical, A 3-fluoro-4-methoxyphenyl radical, a 3-fluoro-4-ethoxy phenyl group, A 2-chloro-4-methoxyphenyl radical, a 3-chloro-4-methoxyphenyl radical, The carbocyclic aromatic series radical which is not permuted [ permutations, such as a 2-methoxy-5-chlorophenyl radical, a 3-methoxy-4-chlorophenyl radical, a 3-methoxy-6-chlorophenyl radical, 5-chloro -2 and 4-dimethoxy phenyl group, or ], [0037] 4-quinolyl radical, 3-quinolyl radical, a 4-methyl-2-quinolyl radical, 4-pyridyl radical, 3-pyridyl radical, 2-pyridyl radical, a 4-methyl-2-pyridyl radical, a 5-methyl-2-pyridyl radical, A 6-methyl-2-pyridyl radical, a 6-fluoro-3-pyridyl radical, a 6-methoxy-3-pyridyl radical, A 6-methoxy-2-pyridyl radical, 3-furyl radical, 2-furyl radical, 3-thienyl group, 2-thienyl group, a 4-methyl-3-thienyl group, a 5-methyl-2-thienyl group. The heterocycle type aromatic series radical which is not permuted [ permutations, such as a 3-methyl-2-thienyl group, 2-oxazolyl radical, 2-thiazolyl radical, 2-benzoxazolyl radical, 2-benzothiazolyl radical, and 2-benzimidazolyl radical, or ], [0038] Benzyl, phenethyl radical, alpha-methylbenzyl radical, alpha, and alpha-dimethylbenzyl radical, 1-naphthyl methyl group, 2-naphthyl methyl group, a furfuryl radical, 2-methylbenzyl radical, 3-methylbenzyl radical, 4-methylbenzyl radical, 4-ethyl benzyl, 4-isopropyl benzyl, a 4-tert-butylbenzyl radical, 4-n-hexyl benzyl, 4-n-nonyl benzyl, 3, 4-dimethylbenzyl radical, 3-methoxybenzyl radical, 4-methoxybenzyl radical, 4-ethoxybenzyl radical, 4-n-butyloxy benzyl, The aralkyl radical which is not permuted [ permutations, such as 4-n-hexyloxy benzyl, 4-n-nonyloxy benzyl, 3-fluoro benzyl, 4-fluoro benzyl, 2-chloro benzyl, and 4-chloro benzyl, or ] can be mentioned.

[0039] In the compound expressed with a general formula (1), A1 and A2 express independently the anthracene diyl radical which is not permuted [ a permutation or ], respectively, and F1, F2, and F3 express independently the fluorene diyl radical which is not permuted [ a permutation or ], respectively.

[0040] As a substituent in case A1, A2, F1, F2, and F3 have a substituent, the aralkyl radical which is not permuted [ the aryl group which is not permuted / a halogen atom, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation, or ] is mentioned, for example.

[0041] In addition, an aryl group expresses heterocycle type aromatic series radicals, such as carbocyclic aromatic series radicals, such as a phenyl group and a naphthyl group, a furyl radical, a thienyl group, and a pyridyl radical.

[0042] As an example of a substituent in case A1, A2, F1, F2, and F3 have a substituent, the aralkyl radical which is not permuted [ the heterocycle type aromatic series radical which is not permuted / the carbocyclic aromatic series radical which is not permuted / the halogen atom mentioned as an example of X1 and X2 a straight chain, branching or an annular alkoxy group, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation or /, a permutation, or ] can be mentioned.

[0043] A1 and A2 For example, the anthracene -1 which is not permuted [ a permutation or ], 4-diyl radical, The anthracene -1 which is not permuted [ the anthracene -1 which is not permuted / a permutation or /, 5-diyl radical, a permutation, or ], 8-diyl radical, The anthracene -1 which is not permuted [ the anthracene -1 which is not permuted / a permutation or /, 9-diyl radical, a permutation, or ], 10-diyl radical, The anthracene -2 which is not permuted [ the

anthracene -2 which is not permuted / a permutation or /, 3-diyl radical, a permutation, or ], 6-diyl radical, The anthracene -2 which is not permuted [ the anthracene -2 which is not permuted / a permutation or /, 7-diyl radical, a permutation, or ], 9-diyl radical, They are the anthracene -9 which is not permuted [ the anthracene -2 which is not permuted / a permutation or /, 10-diyl radical, a permutation, or ] and 10-diyl radical. Preferably The anthracene -1 which is not permuted [ the anthracene -1 which is not permuted / a permutation or /, 4-diyl radical, a permutation, or ], 5-diyl radical, It is the anthracene -9 which is not permuted [ the anthracene -2 which is not permuted / the anthracene -2 which is not permuted / a permutation or /, 6-diyl radical, a permutation, or /, 7-diyl radical, a permutation or ] and 10-diyl radical, and they are the anthracene -9 which is not permuted [ a permutation or ] and 10-diyl radical more preferably.

[0044] F1, F2, and F3 For example, the fluorene -1 which is not permuted [ a permutation or ], 3-diyl radical, The fluorene -1 which is not permuted [ the fluorene -1 which is not permuted / a permutation or /, 6-diyl radical, a permutation, or ], 7-diyl radical, The fluorene -2 which is not permuted [ the fluorene -1 which is not permuted / a permutation or /, 8-diyl radical, a permutation, or ], 6-diyl radical, They are the fluorene -3 which is not permuted [ the fluorene -2 which is not permuted / a permutation or /, 7-diyl radical, a permutation, or ] and 6-diyl radical. Preferably The fluorene -1 which is not permuted [ the fluorene -1 which is not permuted / a permutation or /, 6-diyl radical, a permutation, or ], 7-diyl radical, The fluorene -2 which is not permuted [ the fluorene -1 which is not permuted / a permutation or /, 8-diyl radical, a permutation, or ], 6-diyl radical, They are the fluorene -3 which is not permuted [ the fluorene -2 which is not permuted / a permutation or /, 7-diyl radical, a permutation, or ] and 6-diyl radical. More preferably It is the fluorene -3 which is not permuted [ the fluorene -2 which is not permuted / the fluorene -1 which is not permuted / a permutation or /, 8-diyl radical, a permutation, or /, 7-diyl radical, a permutation or ] and 6-diyl radical, and they are the fluorene -2 which is not permuted [ a permutation or ] and 7-diyl radical still more preferably.

[0045] In the compound expressed with a general formula (1), j, m, and n express 0 or 1, and k and l express 1 or 2. Moreover, when k is 2, A1 may be the same or you may differ, and when l is 2, F2 may be the same or they may differ. \*\*j+l+n whose k+m is 2 is 2, \*\*j and n whose \*\*k is 1 are 0 preferably, l is 1, k is 1, and m is 0, n is \*\*, and m and 0 and the case where l is k and l can be mentioned.

[0046] The value of j, k, l, m, and n can divide roughly into the following structures the compound expressed with a general formula (1).

X1-A1-F2-X2 (1a)  
 X1-F1-A1-F2-X2 (1b)  
 X1-A1-F2-A2-X2 (1c)  
 X1-A1-F2-F2-X2 (1d)  
 X1-A1-A1-F2-X2 (1e)  
 X1-F1-A1-F2-A2-X2 (1f)  
 X1-F1-A1-F2-F2-X2 (1g)  
 X1-F1-A1-A1-F2-X2 (1h)  
 X1-A1-F2-F2-A2-X2 (1i)  
 X1-A1-A1-F2-A2-X2 (1j)  
 X1-A1-A1-F2-F2-X2 (1k)  
 X1-A1-F2-F2-F3-X2 (1l)  
 X1-F1-A1-F2-A2-F3-X2 (1m)  
 X1-F1-A1-F2-F2-A2-X2 (1n)  
 X1-F1-A1-A1-F2-A2-X2 (1o)  
 X1-F1-A1-A1-F2-F2-X2 (1p)  
 X1-A1-A1-F2-F2-A2-X2 (1q)  
 X1-F1-A1-F2-F2-F3-X2 (1r)  
 X1-A1-A1-F2-A1-F3-X2 (1s)  
 X1-A1-A1-F2-F2-F3-X2 (1t)  
 X1-F1-A1-A1-F2-F2-A2-X2 (1u)  
 X1-F1-A1-F2-F2-A2-F3-X2 (1v)  
 X1-F1-A1-A1-F2-A2-F3-X2 (1w)  
 X1-F1-A1-A1-F2-F2-F3-X2 (1x)  
 X1-A1-A1-F2-F2-A2-F3-X2 (1y)  
 X1-F1-A1-A1-F2-F2-A2-F3-X2 (1z)

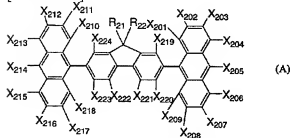
[A1, A2, F1, F2, F3, X1, and X2 express the same semantics as the case of a general formula (1) among a formula.]

[0047] Among such structures, preferably (1a), (1b), (1c), They are (1d), (1f), (1g), (1i), (1l), (1m), (1n), (1r), and (1v) (1y) the structure expressed. More preferably It is (1a), (1b), (1c), (1f), (1g), (1i), (1m), and (1v) the structure expressed, and they are (1a), (1b), and (1c) (1m) the structure expressed still more preferably.

[0048] Furthermore, as a desirable gestalt of a compound expressed with a general formula (1), the compound expressed with the following general formula (A), (\*\* 13), the following general formula (B) (\*\* 14) and the following general formula (C), and (\*\* 15) can be mentioned.

[0049]

[Formula 13]

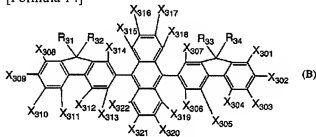


(A)

[0050] (R<sub>21</sub> and R<sub>22</sub> express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] among a formula, respectively, and X<sub>201</sub>-X<sub>224</sub> express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group a permutation, or ], respectively.) However, R<sub>21</sub>, R<sub>22</sub>, and X<sub>201</sub>-X<sub>224</sub> are not an anthryl radical and a fluorenyl group.

[0051]

[Formula 14]

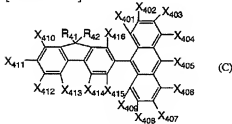


(B)

[0052] (R<sub>31</sub>-R<sub>34</sub> express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] among a formula, respectively, and X<sub>301</sub>-X<sub>322</sub> express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group a permutation, or ], respectively.) However, R<sub>31</sub>-R<sub>34</sub>, and X<sub>301</sub>-X<sub>322</sub> are not an anthryl radical and a fluorenyl group.

[0053]

[Formula 15]



(C)

[0054] (R<sub>41</sub> and R<sub>42</sub> express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] among a formula, respectively, and X<sub>401</sub>-X<sub>416</sub> express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group a permutation, or ], respectively.) However, R<sub>41</sub>, R<sub>42</sub>, and X<sub>401</sub>-X<sub>416</sub> are not an anthryl radical and a fluorenyl group.

[0055] In the compound expressed with a general formula (A), a general formula (B), and a general formula (C), R<sub>21</sub>, R<sub>22</sub>, R<sub>31</sub>-R<sub>34</sub>, and R<sub>41</sub> and R<sub>42</sub> express independently the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group a permutation, or /, a permutation, or ],

respectively. However, R21, R22, R31-R34, and R41 and R42 are not an anthryl radical and a fluorenyl group. In addition, an aryl group expresses heterocycle type aromatic series radicals, such as carbocyclic aromatic series radicals, such as a phenyl group and a naphthyl group, a furil radical, a thienyl group, and a pyridyl radical.

[0056] R21, R22, R31-R34, and R41 and R42 Preferably A hydrogen atom, the straight chain of carbon numbers 1-16, branching, or an annular alkyl group, The heterocycle type aromatic series radical which is not permuted [ the permutation of the carbocyclic aromatic series radical which is not permuted / the permutation of carbon numbers 6-25, or /, and carbon numbers 3-25, or ], They are the permutation of carbon numbers 5-16, or a non-permuted aralkyl radical. Or more preferably The carbocyclic aromatic series radical which is not permuted [ the permutation of a hydrogen atom, the straight chain of carbon numbers 1-10, branching or an annular alkyl group, and carbon numbers 6-12, or ], They are the permutation of the heterocycle type aromatic series radical which is not permuted [ the permutation of carbon numbers 4-12, or ], or carbon numbers 7-12, or a non-permuted aralkyl radical. Still more preferably They are the permutation of the heterocycle type aromatic series radical which is not permuted [ the permutation of the carbocyclic aromatic series radical which is not permuted / the permutation of a hydrogen atom, the straight chain of carbon numbers 1-8, branching or an annular alkyl group, and carbon numbers 6-10 or /, and carbon numbers 4-10, or ], or carbon numbers 7-10, or a non-permuted aralkyl radical.

[0057] As an example of R21, R22, R31-R34, and R41 and R42, the heterocycle type aromatic series radical which is not permuted [ the carbocyclic aromatic series radical which is not permuted / a hydrogen atom or the straight chain mentioned as an example of X1 and X2, branching or an annular alkyl group, a permutation, or / a permutation, or ], a permutation, or a non-permuted aralkyl radical can be mentioned.

[0058] In the compound expressed with a general formula (A), a general formula (B), and a general formula (C), X201-X224, X301-X322, and X401-X416 express independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group a permutation, or ], respectively. However, X201-X224, X301-X322, and X401-X416 are not an anthryl radical and a fluorenyl group. In addition, an aryl group expresses heterocycle type aromatic series radicals, such as carbocyclic aromatic series radicals, such as a phenyl group and a naphthyl group, a furil radical, a thienyl group, and a pyridyl radical.

[0059] X201-X224, X301-X322, and X401-X416 Preferably A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-16, branching, or an annular alkyl group, The carbocyclic aromatic series radical which is not permuted [ the permutation of the straight chain of carbon numbers 1-16, branching or an annular alkoxy group, and carbon numbers 6-25, or ], It is the heterocycle type aromatic series radical which is not permuted [ the permutation of carbon numbers 3-25, or ], More preferably A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-10, branching, or an annular alkyl group, The carbocyclic aromatic series radical which is not permuted [ the permutation of the straight chain of carbon numbers 1-10, branching or an annular alkoxy group, and carbon numbers 6-12, or ], It is the heterocycle type aromatic series radical which is not permuted [ the permutation of carbon numbers 4-12, or ]. Or still more preferably It is the heterocycle type aromatic series radical which is not permuted [ the permutation of the carbocyclic aromatic series radical which is not permuted / the permutation of a hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-8, branching or an annular alkyl group, the straight chain of carbon numbers 1-8, branching or an annular alkoxy group, and carbon numbers 6-10, or /, or carbon numbers 4-10, or ].

[0060] As an example of X201-X224, X301-X322, and X401-X416, the heterocycle type aromatic series radical which is not permuted [ the carbocyclic aromatic series radical which is not permuted / a hydrogen atom or the halogen atom mentioned as an example of X1 and X2 a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation or ] can be mentioned.

[0061] The compound expressed with a general formula (A) preferably X205 and X214 A hydrogen atom, a halogen atom, a straight chain, branching, or an annular alkyl group, The compound which is the aryl group which is not permuted [ a straight chain, branching or an annular alkoxy group, a permutation, or ], X201, X204, X206, X209, X210, X213, X215, and X218 And a hydrogen atom, It is the compound which is a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group. More preferably X205 and X214 are the compounds which are the heterocycle type aromatic series radicals which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or ].

[0062] The compound expressed with a general formula (B) is a compound X315, X318, X319, and whose X322 are a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group preferably.

[0063] The compounds expressed with a general formula (C) are the compound whose X405 is the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group, a permutation, or ], and a compound X401, X404, X406, and whose X409 are a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, or an

annular alkoxy group preferably.

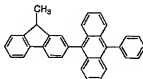
[0064] As an example of the hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly, although the following compounds (\*\* 16 --izing 153) can be mentioned, this invention is not limited to these, for example.

[0065]

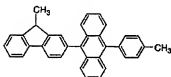
[Formula 16]

例示化合物番号

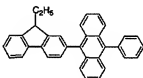
A-1



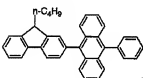
A-2



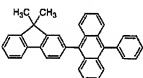
A-3



A-4

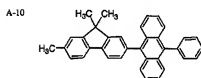
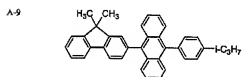
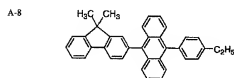
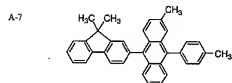
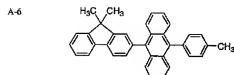


A-5



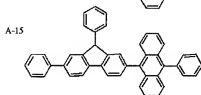
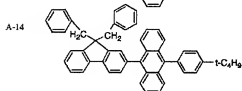
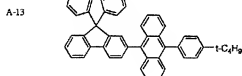
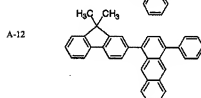
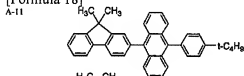
[0066]

[Formula 17]



[0067]

[Formula 18]

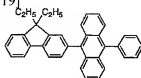




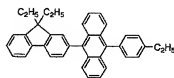
[0068]

[Formula 19]

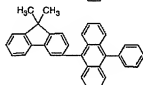
A-16



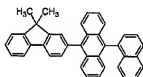
A-17



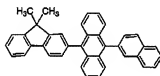
A-18



A-19

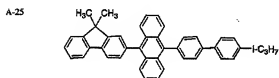
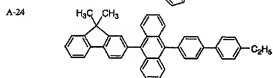
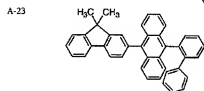
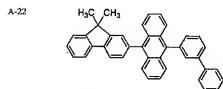
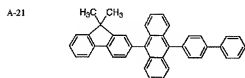


A-20



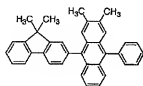
[0069]

[Formula 20]

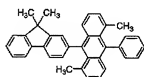


[0070]  
[Formula 21]

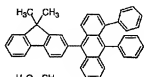
A-26



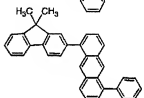
A-27



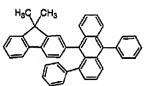
A-28



A-29



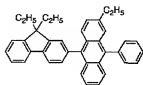
A-30



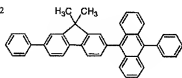
[0071]

[Formula 22]

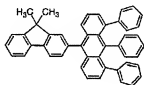
A-31



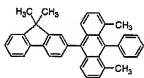
A-32



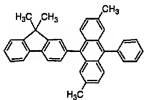
A-33



A-34

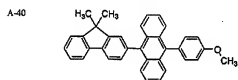
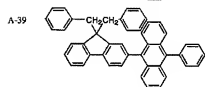
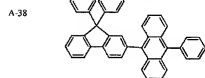
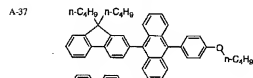
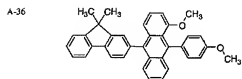


A-35



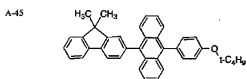
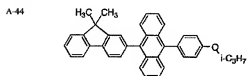
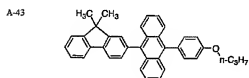
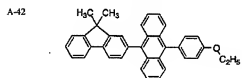
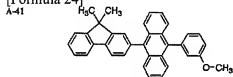
[0072]

[Formula 23]



[0073]

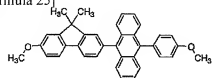
[Formula 24]



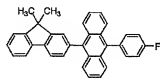
[0074]

[Formula 25]

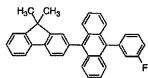
A-46



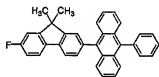
A-47



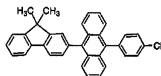
A-48



A-49



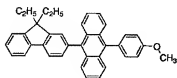
A-50



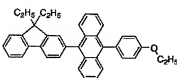
[0075]

[Formula 26]

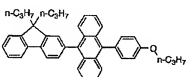
A-51



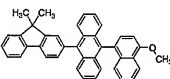
A-52



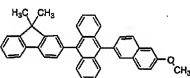
A-53



A-54



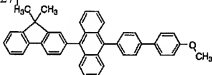
A-55



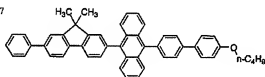
[0076]

[Formula 27]

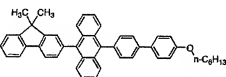
A-56



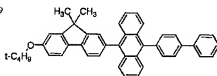
A-57



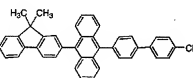
A-58



A-59



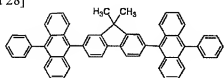
A-60



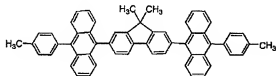
[0077]

[Formula 28]

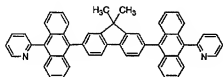
B-1



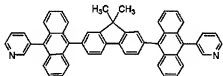
B-2



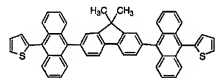
B-3



B-4



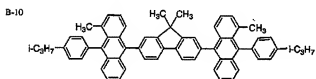
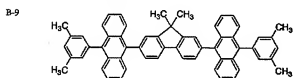
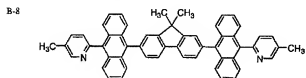
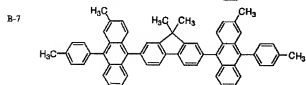
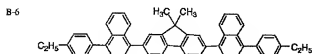
B-5



[0078]

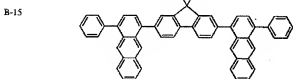
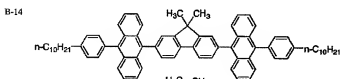
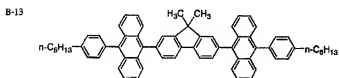
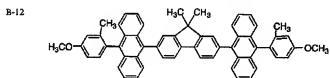
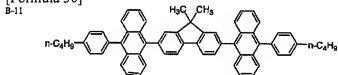
[Formula 29]





[0079]

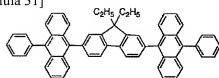
[Formula 30]



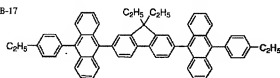
[0080]

[Formula 31]

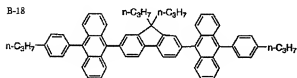
B-16



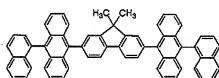
B-17



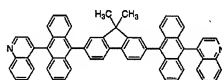
B-18



B-19



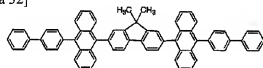
B-20



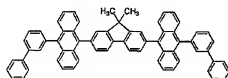
[0081]

[Formula 32]

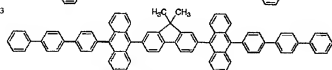
B-21



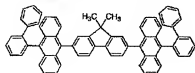
B-22



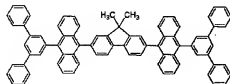
B-23



B-24



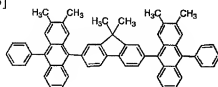
B-25



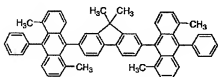
[0082]

[Formula 33]

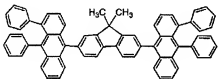
B-26



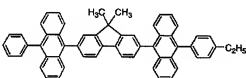
B-27



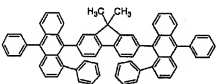
B-28



B-29



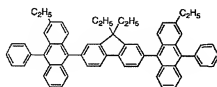
B-30



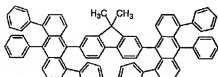
[0083]

[Formula 34]

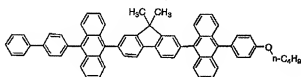
B-31



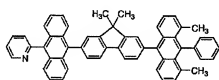
B-32



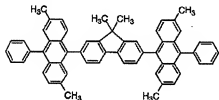
B-33



B-34



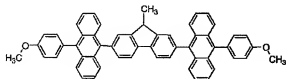
B-35



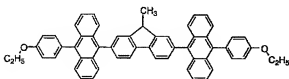
[0084]

[Formula 35]

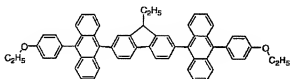
B-36



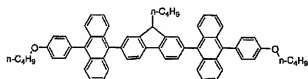
B-37



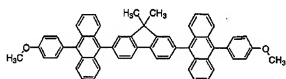
B-38



B-39



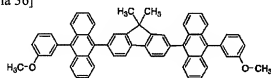
B-40



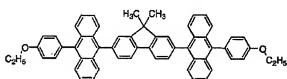
[0085]

[Formula 36]

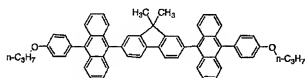
B-41



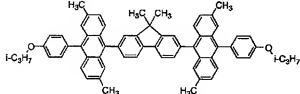
B-42



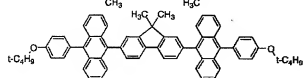
B-43



B-44



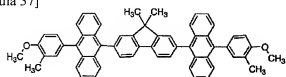
B-45



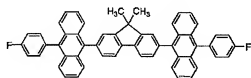
[0086]

[Formula 37]

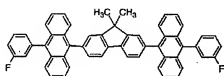
B-46



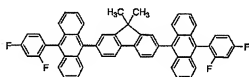
B-47



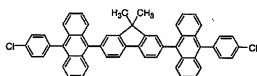
B-48



B-49



B-50



[0087]

[Formula 38]

 ID=000039

[0088]

[Formula 39]

 ID=000040

[0089]

[Formula 40]

 ID=000041

[0090]

[Formula 41]

 ID=000042



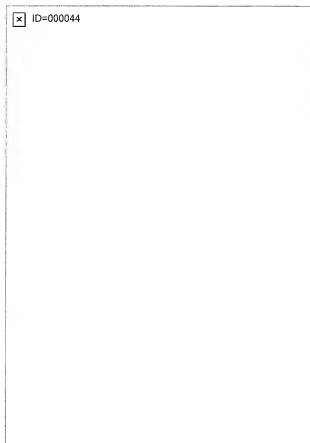
[0091]

[Formula 42]

A large empty rectangular box representing Formula 42. In the top-left corner of this box, there is a small square icon containing an 'x' followed by the text 'ID=000043'.  
x ID=000043

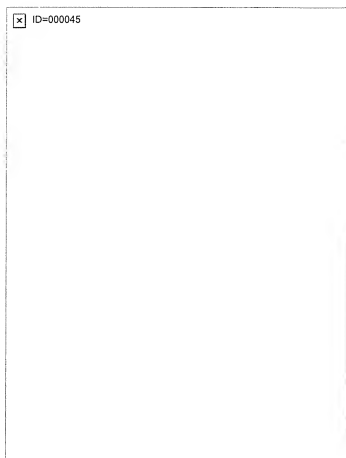
[0092]

[Formula 43]



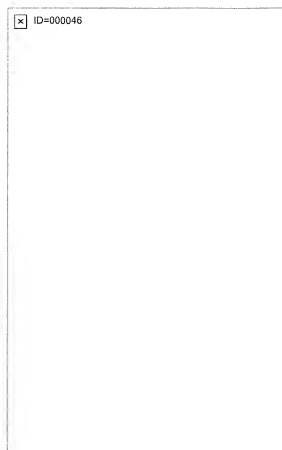
[0093]

[Formula 44]



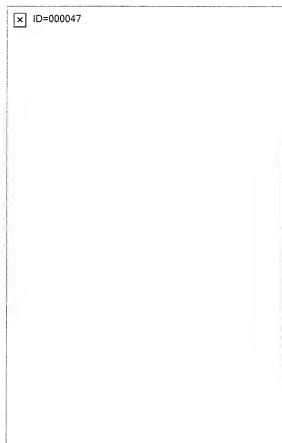
[0094]

[Formula 45]



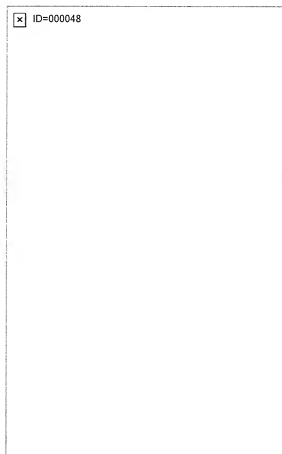
[0095]

[Formula 46]



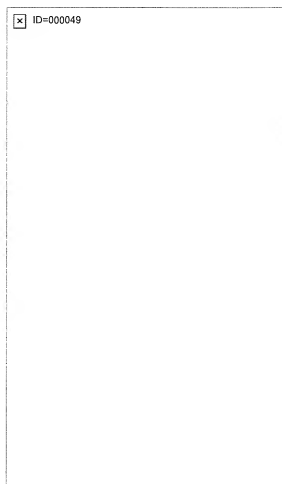
[0096]

[Formula 47]



[0097]

[Formula 48]



[0098]

[Formula 49]



 ID=000050

[0099]

[Formula 50]

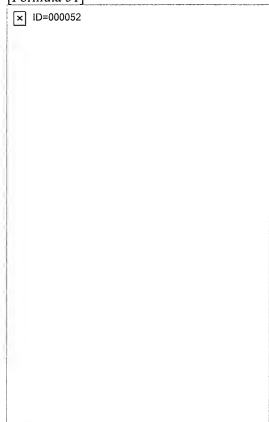


 ID=000051



[0100]

[Formula 51]



[0101]

[Formula 52]

 ID=000053

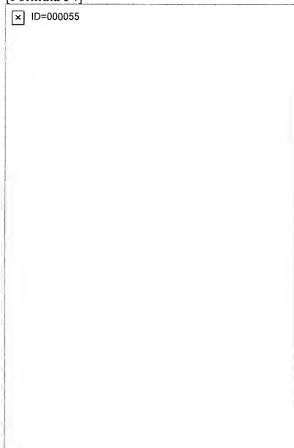
[0102]

[Formula 53]

 ID=000054

[0103]

[Formula 54]



[0104]

[Formula 55]



 ID=000056

[0105]

[Formula 56]

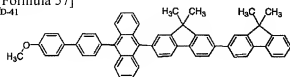


 ID=000057

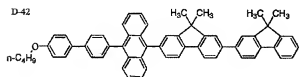
[0106]

[Formula 57]

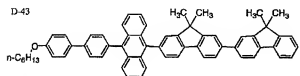
D-41



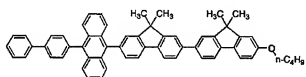
D-42



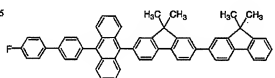
D-43



D-44



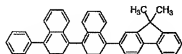
D-45



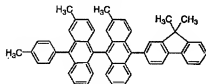
[0107]

[Formula 58]

E-1



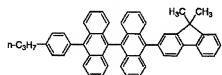
E-2



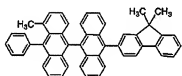
E-3



E-4



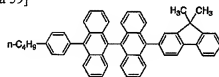
E-5



[0108]

[Formula 59]

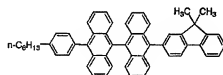
E-6



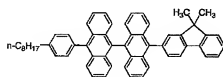
E-7



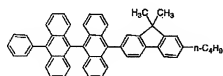
E-8



E-9



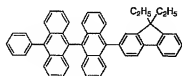
E-10



[0109]

[Formula 60]

E-11



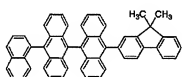
E-12



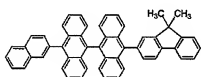
E-13



E-14



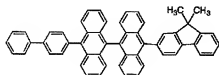
E-15



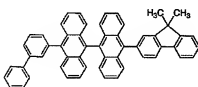
[0110]

[Formula 61]

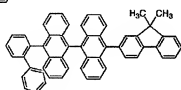
E-16



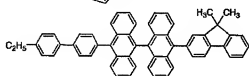
E-17



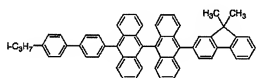
E-18



E-19



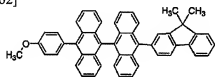
E-20



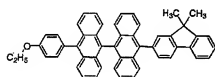
[0111]

[Formula 62]

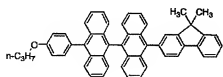
E-21



E-22



E-23



E-24



E-25

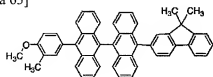




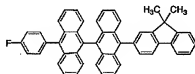
[0112]

[Formula 63]

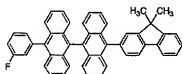
E-26



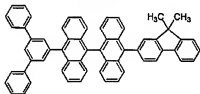
E-27



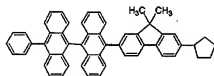
E-28



E-29



E-30



[0113]

[Formula 64]

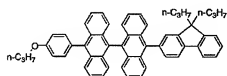
E-31



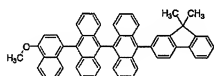
E-32



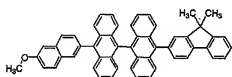
E-33



E-34



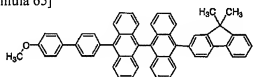
E-35



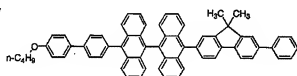
[0114]

[Formula 65]

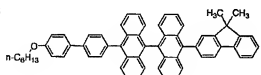
E-36



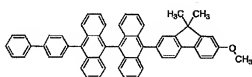
E-37



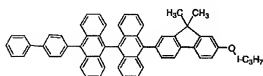
E-38



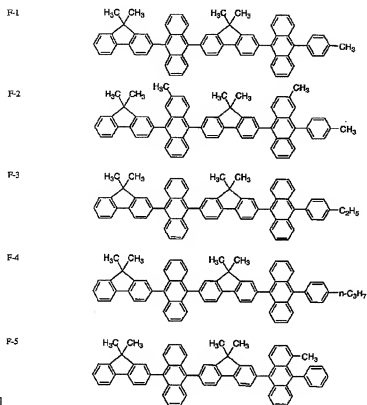
E-39



E-40



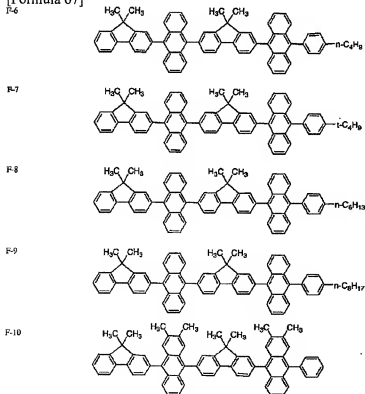
[0115]



[Formula 66]

[0116]

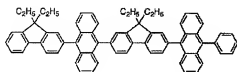
[Formula 67]



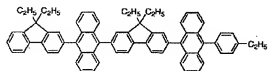
[0117]

[Formula 68]

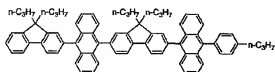
F-11



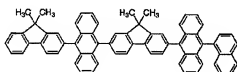
F-12



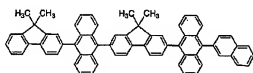
F-13



F-14



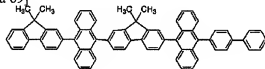
F-15



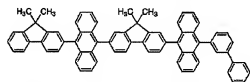
[0118]

[Formula 69]

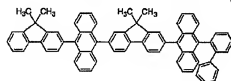
F-16



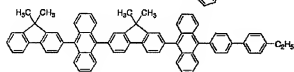
F-17



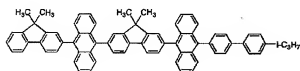
F-18



F-19

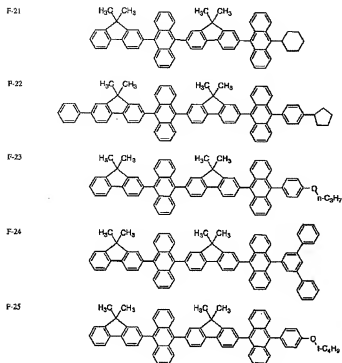


F-20



[0119]

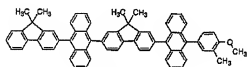
[Formula 70]



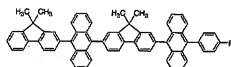
[0120]

[Formula 71]

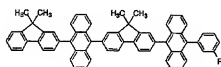
F-26



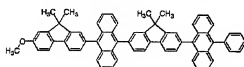
F-27



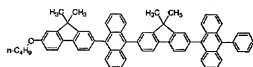
F-28



F-29

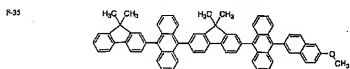
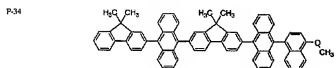
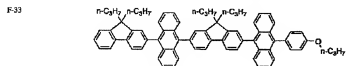
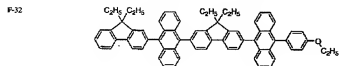
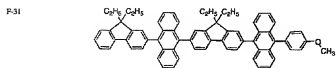


F-30



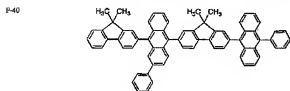
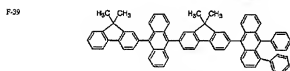
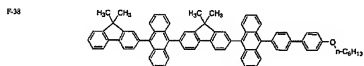
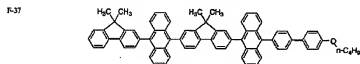
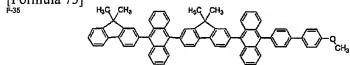
[0121]

[Formula 72]



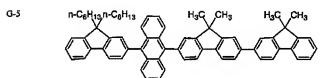
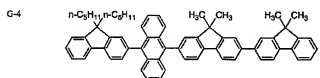
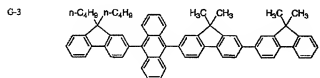
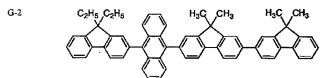
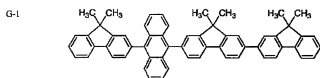
[0122]

[Formula 73]

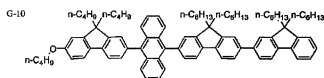
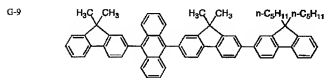
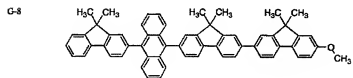
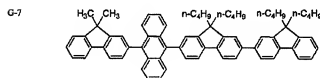
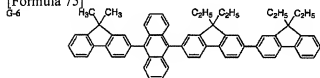


[0123]

[Formula 74]



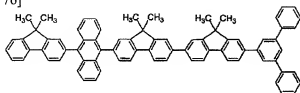
[0124]  
[Formula 75]



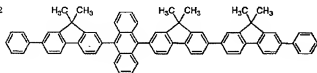
[0125]

[Formula 76]

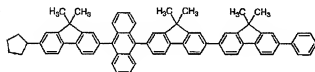
G-11



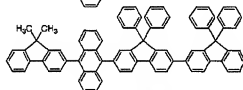
G-12



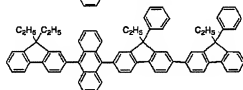
G-13



G-14



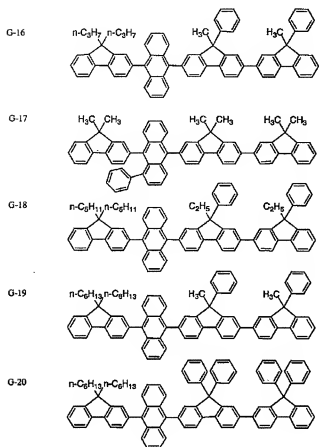
G-15



[0126]

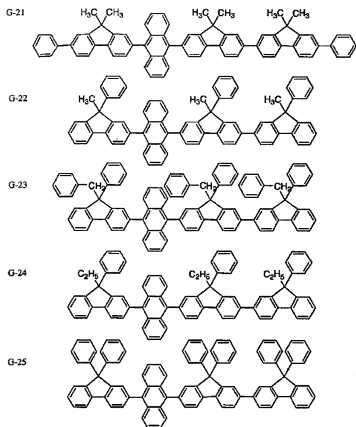
[Formula 77]





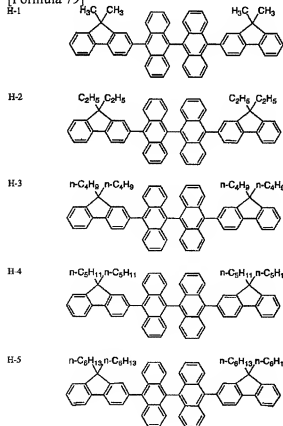
[0127]

[Formula 78]



[0128]

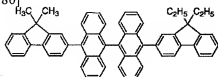
[Formula 79]



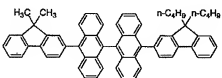
[0129]

[Formula 80]

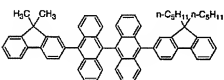
B-6



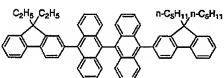
H-7



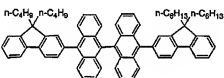
H-8



H-9

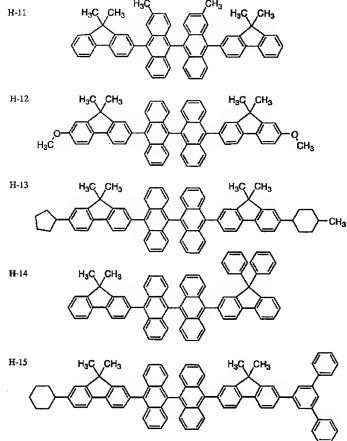


H-10



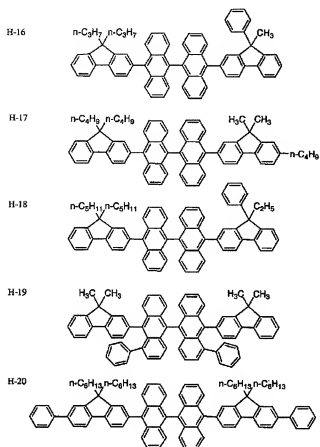
[0130]

[Formula 81]



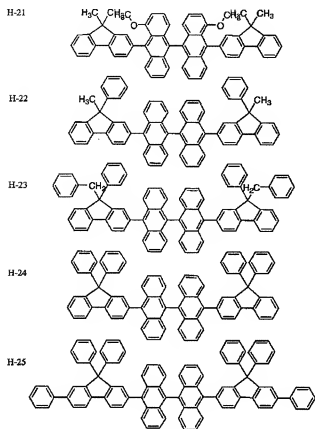
[0131]

[Formula 82]



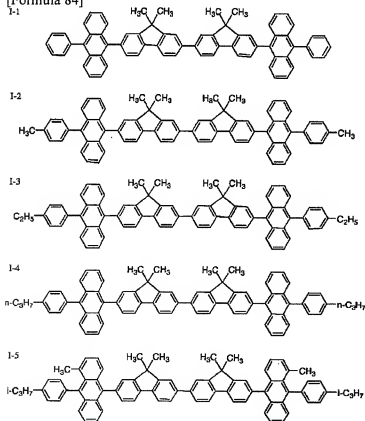
[0132]

[Formula 83]



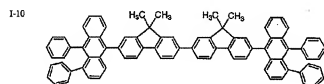
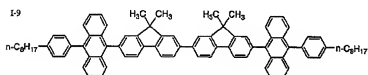
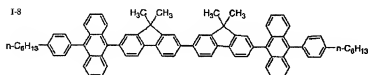
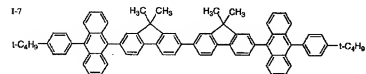
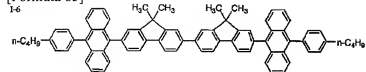
[0133]

[Formula 84]



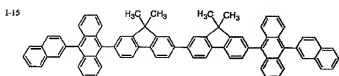
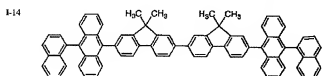
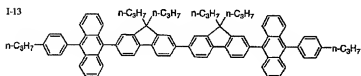
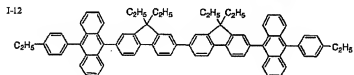
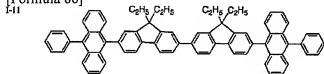
[0134]

[Formula 85]



[0135]

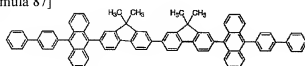
[Formula 86]



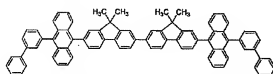
[0136]

[Formula 87]

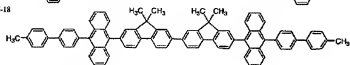
I-16



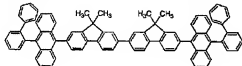
I-17



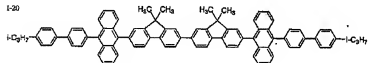
I-18



I-19



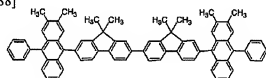
I-20



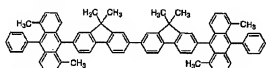
[0137]

[Formula 88]

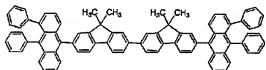
I-21



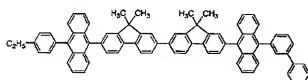
I-22



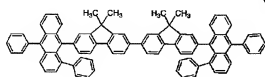
I-23



I-24



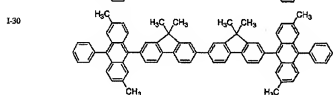
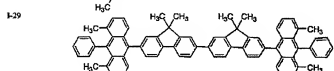
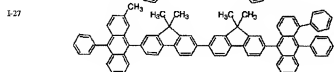
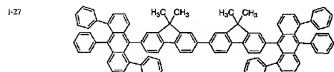
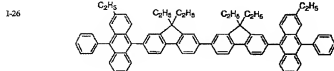
I-25



[0138]

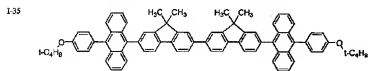
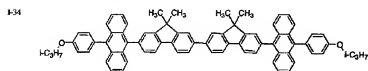
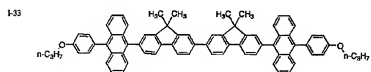
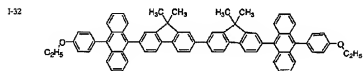
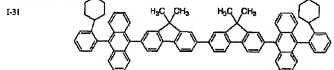
[Formula 89]





[0139]

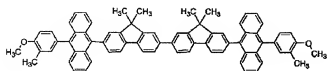
[Formula 90]



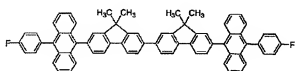
[0140]

[Formula 91]

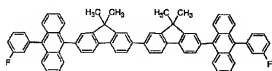
I-36



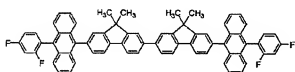
I-37



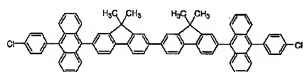
I-38



I-39



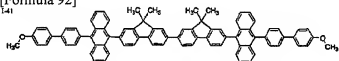
I-40



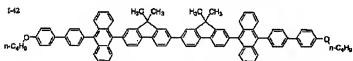
[0141]

[Formula 92]

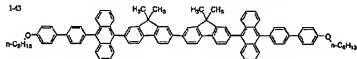
I-41



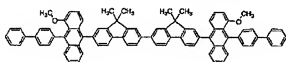
I-42



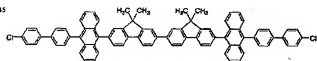
I-43



I-44



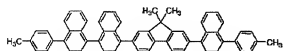
I-45



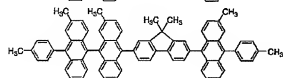
[0142]

[Formula 93]

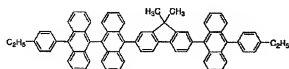
J-1



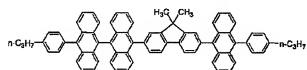
J-2



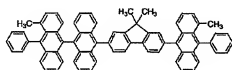
J-3



J-4



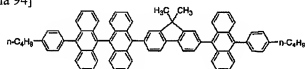
J-5



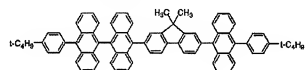
[0143]

[Formula 94]

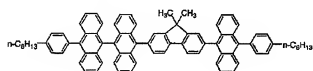
J-6



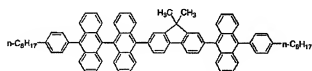
J-7



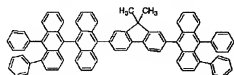
J-8



J-9



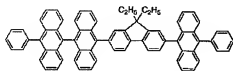
J-10



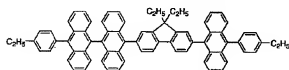
[0144]

[Formula 95]

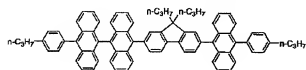
J-11



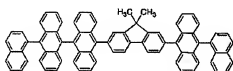
J-12



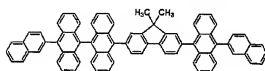
J-13



J-14



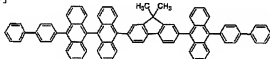
J-15



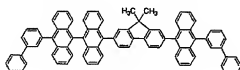
[0145]

[Formula 96]

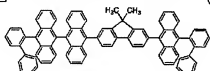
J-16



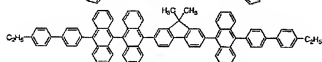
J-17



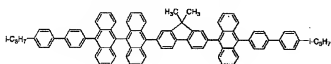
J-18



J-19



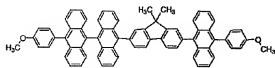
J-20



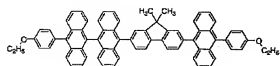
[0146]

[Formula 97]

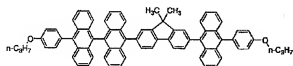
J-21



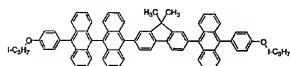
J-22



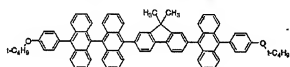
J-23



J-24



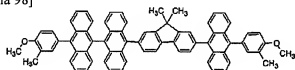
J-25



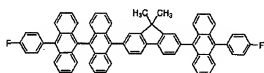
[0147]

[Formula 98]

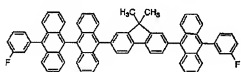
J-26



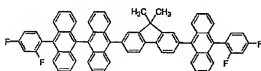
J-27



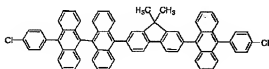
J-28



J-29



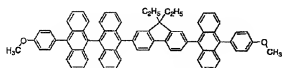
J-30



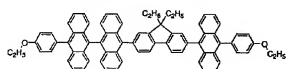
[0148]

[Formula 99]

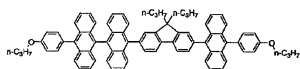
J-31



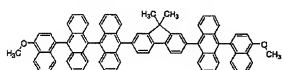
J-32



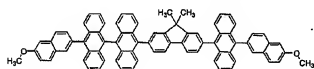
J-33



J-34



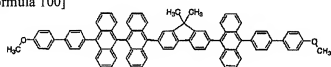
J-35



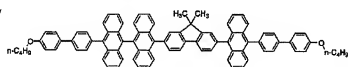
[0149]

[Formula 100]

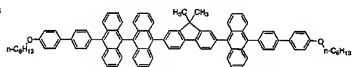
J-36



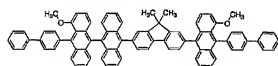
J-37



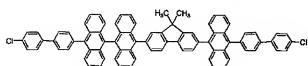
J-38



J-39

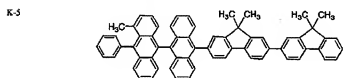
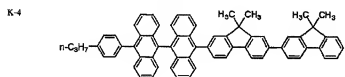
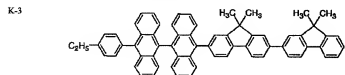
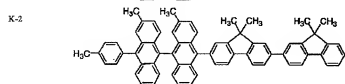
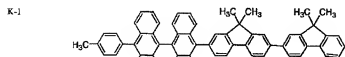


J-40



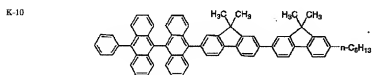
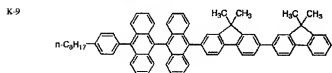
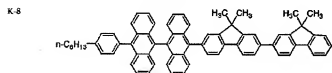
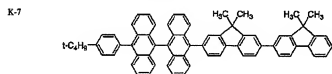
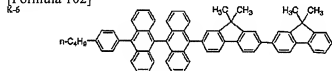
[0150]

[Formula 101]



[0151]

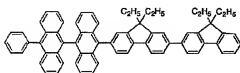
[Formula 102]



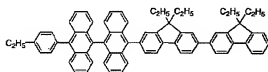
[0152]

[Formula 103]

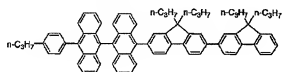
K-11



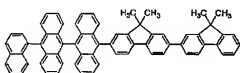
K-12



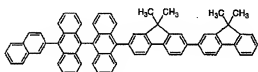
K-13



K-14



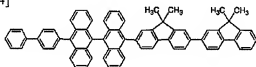
K-15



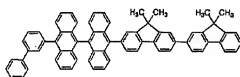
[0153]

[Formula 104]

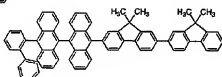
K-16



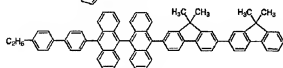
K-17



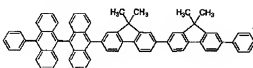
K-18



K-19



K-20

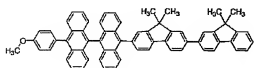


[0154]

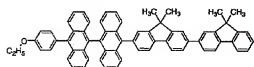
[Formula 105]



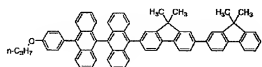
K-21



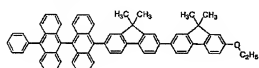
K-22



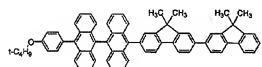
K-23



K-24



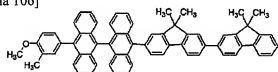
K-25



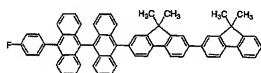
[0155]

[Formula 106]

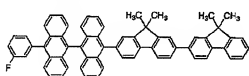
K-26



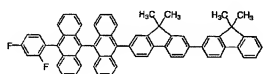
K-27



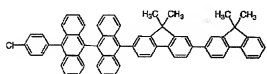
K-28



K-29



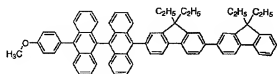
K-30



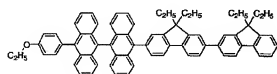
[0156]

[Formula 107]

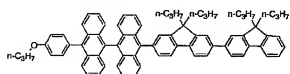
K-31



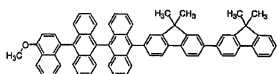
K-32



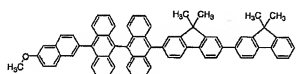
K-33



K-34



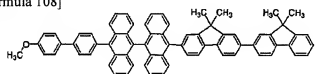
K-35



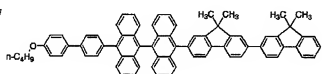
[0157]

[Formula 108]

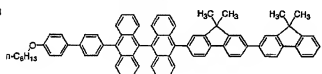
K-36



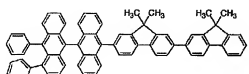
K-37



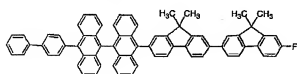
K-38



K-39

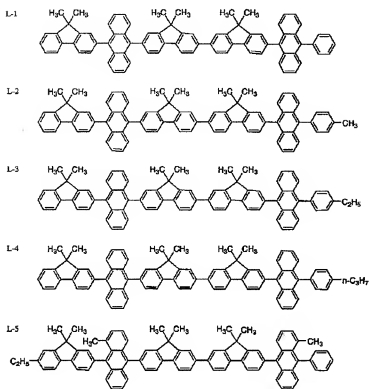


K-40



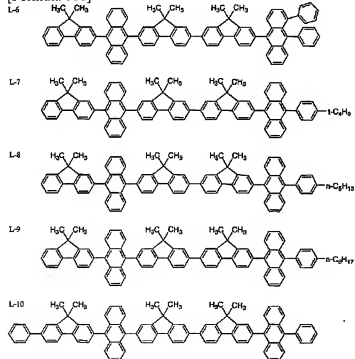
[0158]

[Formula 109]



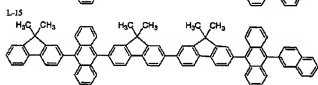
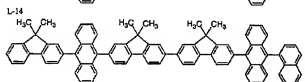
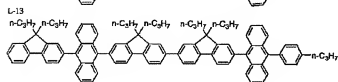
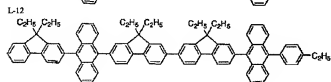
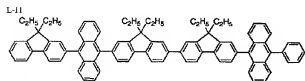
[0159]

[Formula 110]



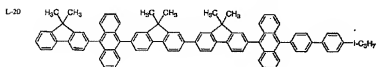
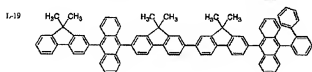
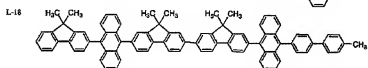
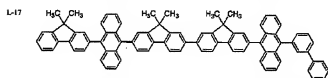
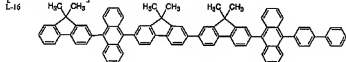
[0160]

[Formula 111]



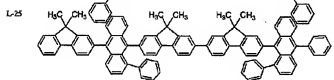
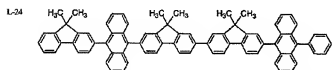
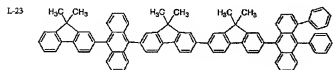
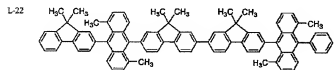
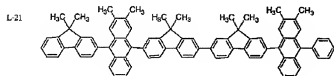
[0161]

[Formula 112]



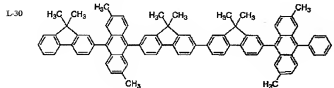
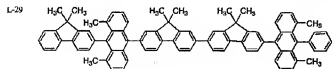
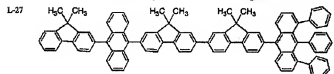
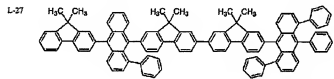
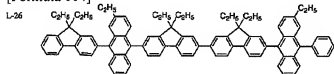
[0162]

[Formula 113]



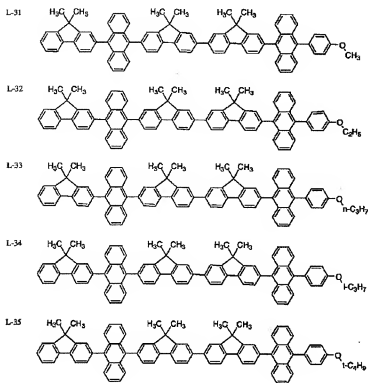
[0163]

[Formula 114]



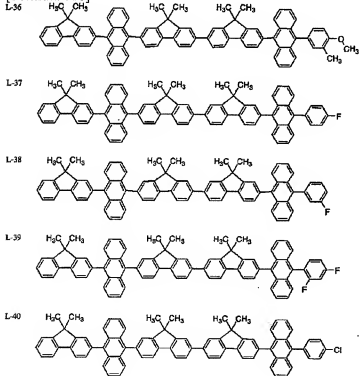
[0164]

[Formula 115]



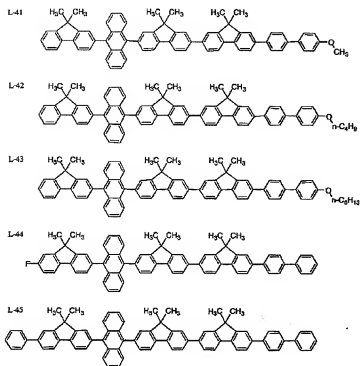
[0165]

[Formula 116]



[0166]

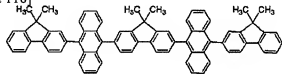
[Formula 117]



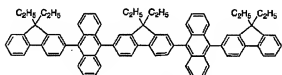
[0167]

[Formula 118]

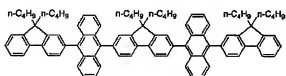
M-1



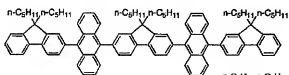
M-2



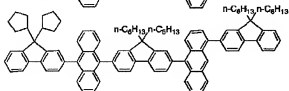
M-3



M-4

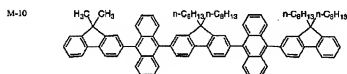
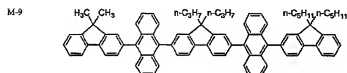
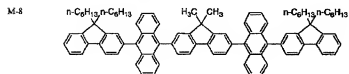
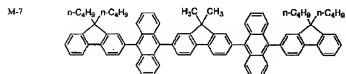
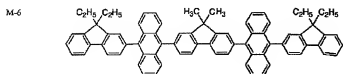


M-5



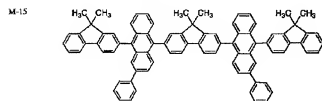
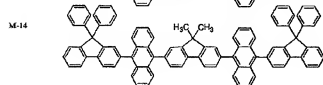
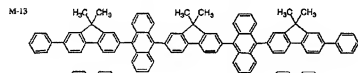
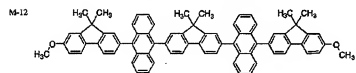
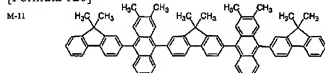
[0168]

[Formula 119]



[0169]

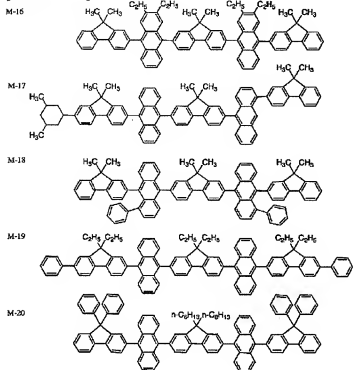
[Formula 120]



[0170]

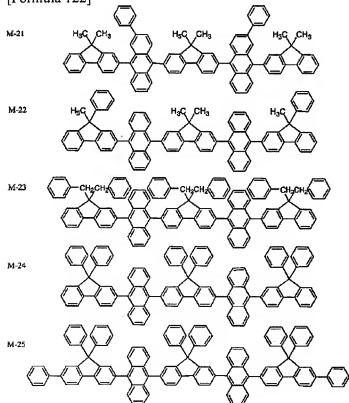


## [Formula 121]



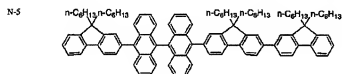
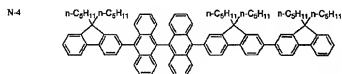
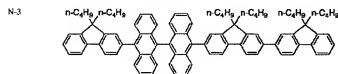
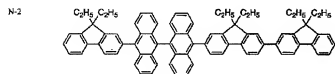
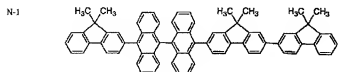
## [0171]

## [Formula 122]



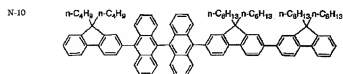
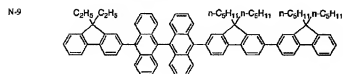
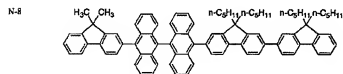
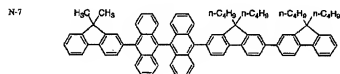
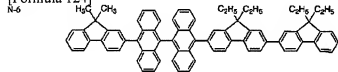
## [0172]

## [Formula 123]



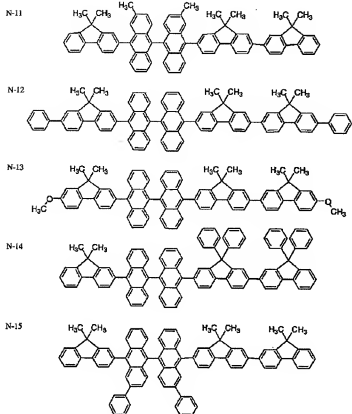
[0173]

[Formula 124]



[0174]

[Formula 125]



[0175]

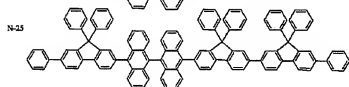
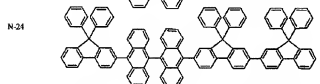
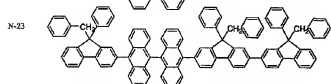
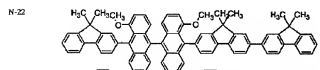
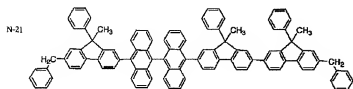
[Formula 126]

&lt;IMG SRC="getimg.ipdl?"

N0000=15&N0001=web146&N0002=008&N0003=JPA415229273\_000127.gif&N0004=20071212100049156117.stamp"  
 WIDTH="392" HEIGHT="434" ALT="ID=000127">

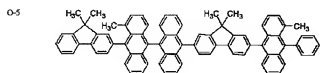
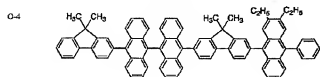
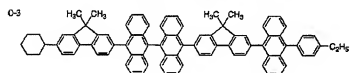
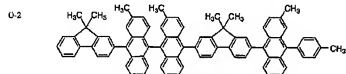
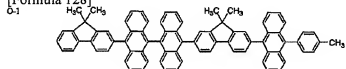
[0176]

[Formula 127]



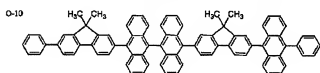
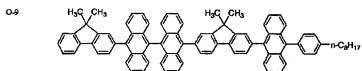
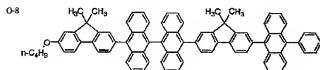
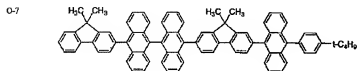
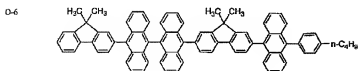
[0177]

[Formula 128]



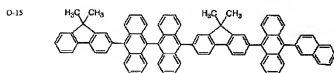
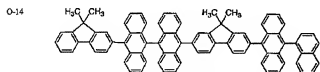
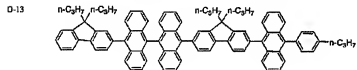
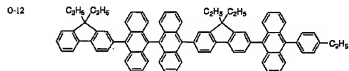
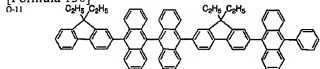
[0178]

[Formula 129]



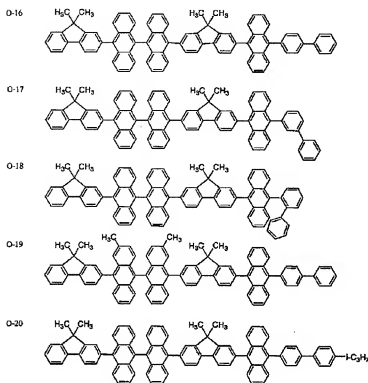
[0179]

[Formula 130]



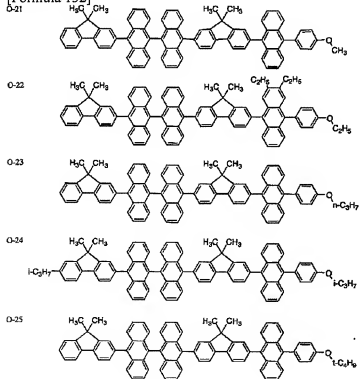
[0180]

[Formula 131]



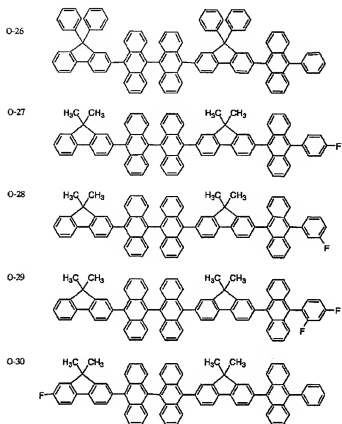
[0181]

[Formula 132]



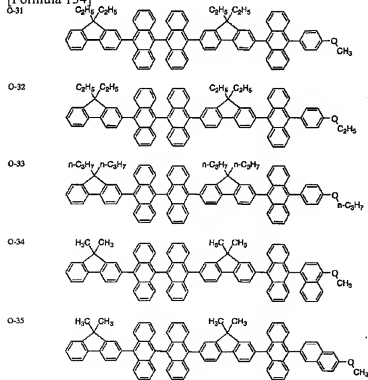
[0182]

[Formula 133]



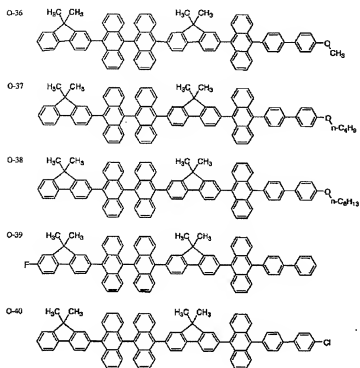
[0183]

[Formula 134]



[0184]

[Formula 135]



[0185]

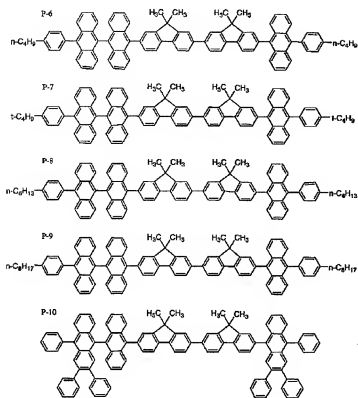
[Formula 136]

☒ ID=000137

[0186]

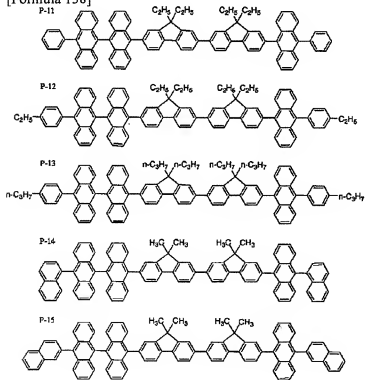
[Formula 137]





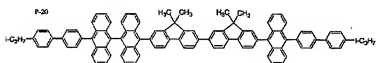
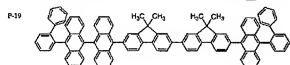
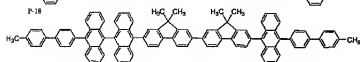
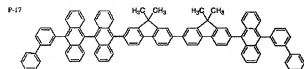
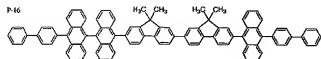
[0187]

[Formula 138]



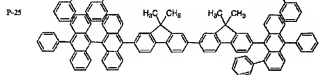
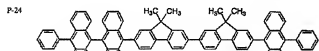
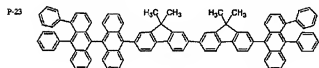
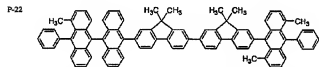
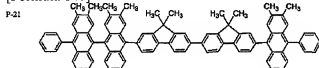
[0188]

[Formula 139]



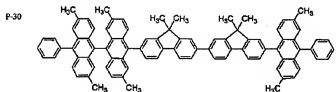
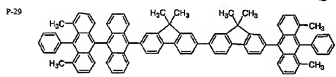
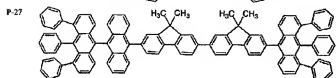
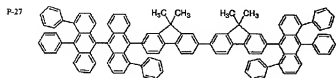
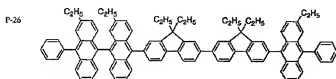
[0189]

[Formula 140]



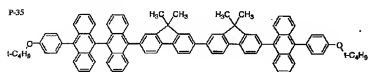
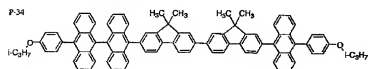
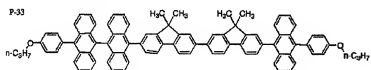
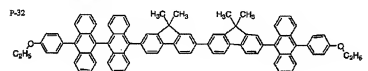
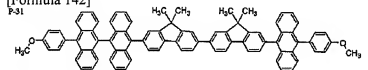
[0190]

[Formula 141]



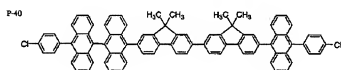
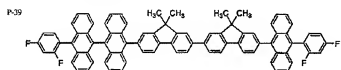
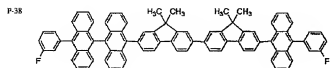
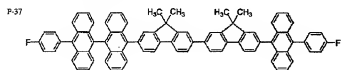
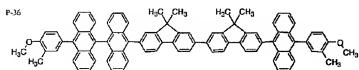
[0191]

[Formula 142]



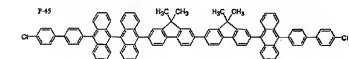
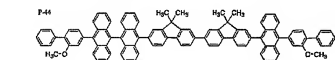
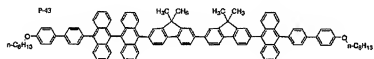
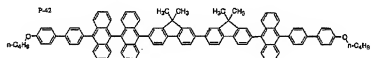
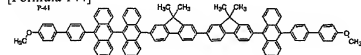
[0192]

[Formula 143]



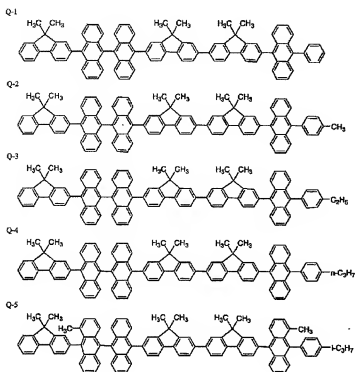
[0193]

[Formula 144]



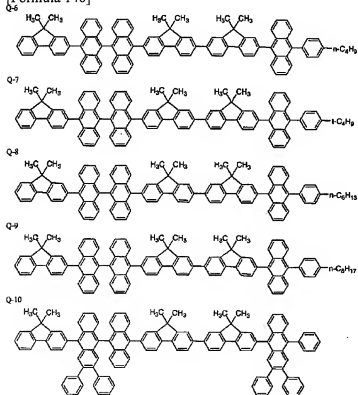
[0194]

[Formula 145]



[0195]

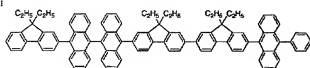
[Formula 146]



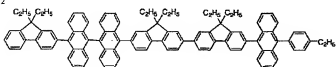
[0196]

[Formula 147]

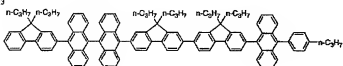
Q-11



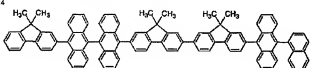
Q-12



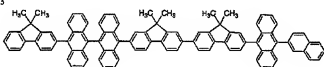
Q-13



Q-14



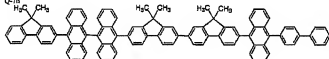
Q-15



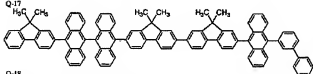
[0197]

[Formula 148]

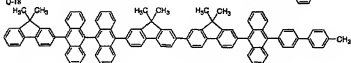
Q-16



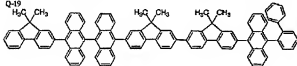
Q-17



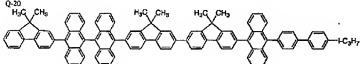
Q-18



Q-19

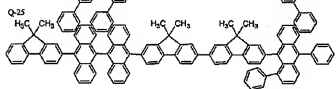
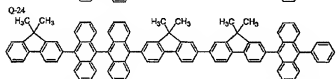
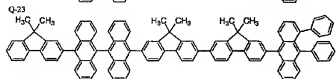
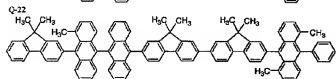
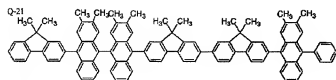


Q-20



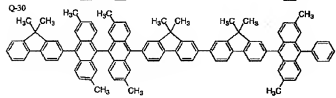
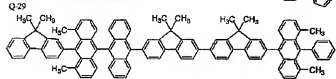
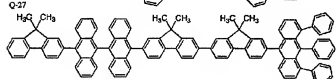
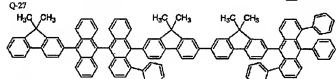
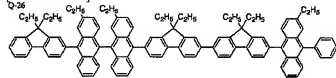
[0198]

[Formula 149]



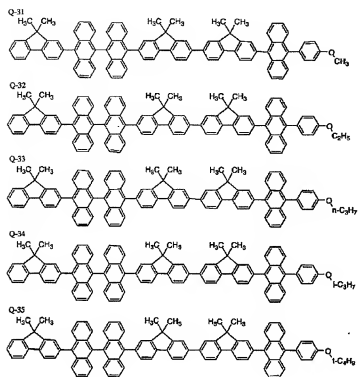
[0199]

[Formula 150]



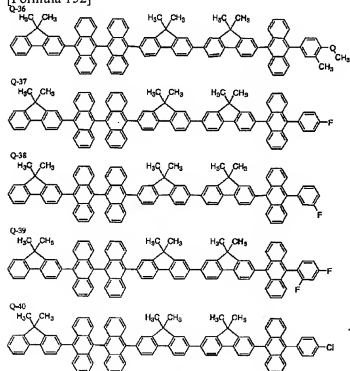
[0200]

[Formula 151]



[0201]

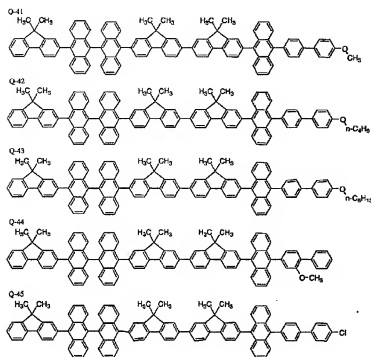
[Formula 152]



[0202]

[Formula 153]





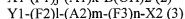
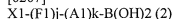
[0203] The compound A concerning this invention is the instantiation compound number A-1 to A-60, B-1 to B-60, C-1 to C-45, F-1-F-40, G-1 to G-25, I-1 to I-45, and a compound expressed with M-1 to M-25 preferably. More preferably They are the instantiation compound number A-1 to A-60, B-1 to B-60, C-1 to C-45, F-1-F-40, I-1 to I-45, and the compound expressed with M-1 to M-25. They are A-1 to A-60, B-1 to B-60, C-1 to C-45, and the compound expressed with M-1 to M-25 still more preferably.

[0204] The hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly can be manufactured by the following approaches. namely, for example, a halogeno anthracene derivative and a fluorenyl boronic acid derivative -- for example, a palladium compound -- [ -- for example tetrakis (triphenylphosphine) palladium, bis(triphenylphosphine) palladium chloride, and tris(dibenzylidene acetone)dipalladium] and a base -- [ -- for example it is made to react under existence of organic base], such as inorganic bases, such as a sodium carbonate, a sodium hydrogencarbonate, and potassium carbonate, triethylamine, and a pyridine, -- [ -- for example Chem.Rev. and] which can refer to an approach given in 95 and 2457 (1995) -- it can manufacture by things.

[0205] Moreover, the hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly for example, an anthryl boronic acid derivative and a halogeno fluorene derivative -- for example, a palladium compound -- [ -- for example tetrakis (triphenylphosphine) palladium, bis(triphenylphosphine) palladium chloride, and tris(dibenzylidene acetone)dipalladium] and a base -- [ -- for example it is made to react under existence of organic base], such as inorganic bases, such as a sodium carbonate, a sodium hydrogencarbonate, and potassium carbonate, triethylamine, and a pyridine, -- [ -- for example Chem.Rev. and] which can refer to an approach given in 95 and 2457 (1995) -- it can manufacture by things.

[0206] The compound expressed with the general formula (1) concerning this invention can be manufactured by the following approaches. namely, -- for example, the boronic acid compound expressed with the following general formula (2) and the compound expressed with the following general formula (3) -- for example, a palladium compound -- [ -- for example tetrakis (triphenylphosphine) palladium, bis(triphenylphosphine) palladium chloride, and tris(dibenzylidene acetone)dipalladium] and a base -- [ -- for example it is made to react under existence of organic base], such as inorganic bases, such as a sodium carbonate, a sodium hydrogencarbonate, and potassium carbonate, triethylamine, and a pyridine, -- [ -- for example Chem.Rev. and] which can refer to an approach given in 95 and 2457 (1995) -- it can manufacture by things.

[0207]



[A1, A2, F1, F2, F3, X1, X2, j, k, l, m, and n express the same semantics as the case of a general formula (1) among a top type, and Y1 expresses a halogen atom or a trifluoromethane sulfonyloxy radical.]

[0208] In a general formula (3), Y1 expresses a halogen atom or a trifluoromethane sulfonyloxy radical, and expresses a

chlorine atom, a bromine atom, and an iodine atom preferably.

[0209] moreover, the compound by which the compound expressed with a general formula (1) is expressed for example, with the following general formula (4) and the boric-acid compound expressed with the following general formula (5) -- for example, a palladium compound -- [ -- for example tetrakis (triphenylphosphine) palladium, bis(triphenylphosphine) palladium chloride, and tris(dibenzylidene acetone)dipalladium] and a base -- [ -- for example it is made to react under existence of organic base], such as inorganic bases, such as a sodium carbonate, a sodium hydrogencarbonate, and potassium carbonate, triethylamine, and a pyridine, -- [ -- for example Chem.Rev. and] which can refer to an approach given in 95 and 2457 (1995) -- it can manufacture by things.

[0210]

X1-(F1)j-(A1)k-Y2 (4)

(HO)2B-(F2)l-(A2)m-(F3)n-X2 (5)

[A1, A2, F1, F2, F3, X1, X2, j, k, l, m, and n express the same semantics as the case of a general formula (1) among a top type, and Y2 expresses a halogen atom or a trifluoromethane sulfonyloxy radical.]

[0211] In a general formula (4), Y2 expresses a halogen atom or a trifluoromethane sulfonyloxy radical, and expresses a chlorine atom, a bromine atom, and an iodine atom preferably.

[0212] In addition, the compound expressed with a general formula (2) and a general formula (5) can be manufactured by making the RICHIO compound or Grignard reagent which for example, n-butyl lithium and metal magnesium are made to act on the compound expressed with a general formula (4) and a general formula (3), and can be adjusted to it, trimethoxy boron, triisopropoxy boron, etc. react.

[0213] Moreover, the compound whose A1 is the anthracene -9 which is not permuted [ a permutation or ] and 10-diyl radical among the compounds expressed with a general formula (1) can be manufactured by the following approaches. For example, to the compound expressed with a general formula (4) and the following general formula (6), namely, for example, the RICHIO compound or Grignard reagent which n-butyl lithium and metal magnesium are made to act and can be adjusted, The compound which the anthraquinone which is not permuted [ a permutation or ] is made to react and is obtained by carrying out dehydration aromatization under existence of an acid (for example, a hydroiodic acid, a hydrobromic acid) A1 is the anthracene -9 which is not permuted [ a permutation or ] and 10-diyl radical among the compounds expressed with a general formula (1), and the compound whose k is 1 can be manufactured.

[0214] X1-(F1)j-Y3 (6)

[F1, X1, and j express the same semantics as the case of a general formula (1) among a top type, and Y3 expresses a halogen atom.]

[0215] In a general formula (6), Y3 expresses a halogen atom and expresses a chlorine atom, a bromine atom, and an iodine atom preferably.

[0216] To the compound expressed with a general formula (3) and a general formula (6), similarly Moreover, for example, the RICHIO compound or Grignard reagent which n-butyl lithium and metal magnesium are made to act and can be adjusted, The compound which BIAN SURON which is not permuted [ a permutation or ] is made to react and is obtained by carrying out dehydration aromatization under existence of an acid (for example, a hydroiodic acid, a hydrobromic acid) A1 is the anthracene -9 which is not permuted [ a permutation or ] and 10-diyl radical among the compounds expressed with a general formula (1), and the compound whose k is 2 can be manufactured.

[0217] The hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly may be manufactured in the form in which the solvation with the solvent (for example, aromatic hydrocarbon system solvents, such as toluene) used by the case was formed. The hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly does not include such solvate, and, of course, also includes the non-solvate which does not contain a solvent.

[0218] Such solvate can also be used for the organic electroluminescence devices of this invention as well as the non-solvate of the hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly. In addition, when using the hydrocarbon compound which the anthracene ring concerning this invention and the fluorene ring couple directly for organic electroluminescence devices, it is desirable to use together the purification approaches, such as the recrystallizing method, the column-chromatography method, and a sublimation purification method, or these approaches, and to use the compound which raised purity.

[0219] The hydrocarbon compound which has the amino substituent used by this invention next is explained to a detail.

The hydrocarbon compound which has an amino substituent concerning this invention expresses preferably the compound expressed with the following general formula (a), (\*\* 154), a general formula (b) (\*\* 155) and a general formula (c), and (\*\* 156).

[0220]

[Formula 154]



[0222]

[Formula 155]



[0224]

[Formula 156]



94 9 9 9 9 9 9 9

least ] A31 or A32 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z31-Z38, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, The aryloxy group which is not permuted [ the aryl group which is not permuted / a permutation or /, a permutation, or ], expressing the aralkyl radical which is not permuted [ the arylthio radical which is not permuted / a permutation or /, a permutation, or ], Ar1 expresses a divalent aromatic series radical, R61 and R62 express the aryl group which is not permuted [ a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ], and p31 expresses 0 or 1 -- ]

[0226] In a general formula (a) A11 and A12 The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A11 or A12 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z101-Z116, respectively A hydrogen atom, a halogen atom, a straight chain, Expressing the aralkyl radical which is not permuted [ the arylthio radical which is not permuted / the aryloxy group which is not permuted / the aryl group which is not permuted / branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or /, a permutation, or ], p11 and p12 express 0 or 1.

[0227] In a general formula (b) A21 and A22 The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A21 or A22 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z201-Z220, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, The aryl group which is not permuted [ a permutation or ] is expressed, R51-R54 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ], and p21 expresses 0 or 1.

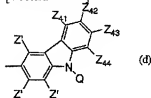
[0228] In a general formula (c) A31 and A32 The aryl group which is not permuted [ a hydrogen atom, a permutation, or ], Express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ], and either [ at least ] A31 or A32 express the amino group or nitrogen-containing heterocycle radical which is not permuted [ a permutation or ]. This amino group or a nitrogen-containing heterocycle radical may form nitrogen-containing heterocycle with the permuted benzene ring. Independently Z31-Z38, respectively A hydrogen atom, a halogen atom, a straight chain, Branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, The aryloxy group which is not permuted [ the aryl group which is not permuted / a permutation or /, a permutation, or ], Expressing the aralkyl radical which is not permuted [ the arylthio radical which is not permuted / a permutation or /, a permutation, or ], Ar1 expresses a divalent aromatic series radical, R61 and R62 express the aryl group which is not permuted [ a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ], and p31 expresses 0 or 1.

[0229] In the compound expressed with a general formula (a), a general formula (b), and a general formula (c) as an example of A11, A12, A21, A22, A31, and A32 For example, a hydrogen atom, a phenyl group, a naphthyl group, an anthrlyl radical, a pyrenyl radical, 4-phenyl phenyl group, 4-phenoxyphenyl radical, 4-(2'-phenyl isopropyl) phenyl group, Aryl groups, such as 4-(2'-phenyl hexafluoro isopropyl) phenyl, The amino group, N-methylamino radical, N-ethylamino radical, an N-n-butylamino radical, N-cyclohexylamino radical, the N-n-octyl amino group, the N-n-DESHIRU amino group, N-benzylamino radical, N-phenylamino radical, N-(3-methylphenyl) amino group, The N-phenyl-N-(4-methoxy-2-methylphenyl) amino group, N-(4-methylphenyl) amino group, N-(4-n-buthylphenyl) amino group, N-(4-methoxyphenyl) amino group, N-(3-fluoro phenyl) amino group, N-(4-chlorophenyl) amino group, N-(1-naphthyl) amino group, N-(2-naphthyl) amino-group, N, and N-dimethylamino radical, N, and N-diethylamino radical, An N and N-G n-butylamino radical, N, and N-G n-hexylamino radical, The N and N-G n-octyl amino-group, N, and N-G n-DESHIRU amino group, An N and N-G n-dodecylamino radical, an N-methyl-N-ethylamino radical, An N-ethyl-N-n-butylamino radical, an N-methyl-N-phenylamino radical, A N-iso-propyl-N-phenylamino radical, a N-n-butyl-N-phenylamino radical, N-tert-butyl-N-phenylamino radical, N, and N-diphenylamino radical, N and N-JI (3 methylphenyl) amino-group, N, and N-JI (4-methylphenyl) amino group, N and N-JI (4-ethyl phenyl) amino-group, N, and N-JI (4-tert-buthylphenyl) amino group, N and N-JI (4-n-hexyl phenyl) amino-group, N, and N-JI (4-methoxyphenyl) amino group, N and N-JI (4-ethoxy phenyl) amino-group, N, and N-JI (4-n-butyloxy phenyl) amino group, N and N-JI (4-n-hexyloxy phenyl) amino-group, N, and N-JI (4-phenyl phenyl) amino group, N and N-JI (4-phenoxyphenyl) amino-group, N, and N-JI (4-phenylthiophenyl) amino group, N and N-JI [4-(2'-phenyl isopropyl) phenyl] amino group, N and N-JI [4-(2'-phenyl hexafluoro isopropyl) phenyl] amino group, N and N-JI (1-naphthyl) amino-group, N, and N-JI (2-naphthyl) amino group, The N-phenyl-N-(3-methylphenyl) amino group, the N-phenyl-N-(4-methylphenyl) amino group, The N-phenyl-N-(4-octyl phenyl) amino

group, the N-phenyl-N-(4-methoxyphenyl) amino group, The N-phenyl-N-(4-ethoxy phenyl) amino group, the N-phenyl-N-(4-n-hexyloxy phenyl) amino group, The N-phenyl-N-(4-fluoro phenyl) amino group, the N-phenyl-N-(1-naphthyl) amino group, The amino group which is not permuted [ permutations, such as an N-phenyl-N-(2-naphthyl) amino group and an N-phenyl-N-(4-phenyl phenyl) amino group, or ], A carbazoyl radical, a FENOCHIAZENIRU machine, a phenoxaziny radical, a dibenzo [b, f] AZEPINIRU radical, You may be the nitrogen-containing heterocycle radical which nitrogen-containing heterocycle radicals, such as 10 and 11-hydrodibenzo [b, f] AZEPINIRU, are mentioned, and is further expressed with the following general formula (d) and (\*\* 157) with the permuted benzene ring.

[0230]

[Formula 157]



(d)

[0231] Z101, or Z103, Z102 and Z104 of a general formula (a), Z' among [type Or Z106 or Z107, Z105 and Z108, Z201 of a general formula (b), or Z202 and Z203, Or Z207, or Z208 and Z209, Or Z31, or Z33, Z32 and Z34 of a general formula (c), Z36, or Z38, Z35 and Z37 are expressed. Z41-Z44 Or a hydrogen atom, A halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, or an annular alkoxy group, It is] to which the aryloxy group which is not permuted [ the aralkyl radical which is not permuted / the aryl group which is not permuted / a permutation or /, a permutation, or /, a permutation, or ] is expressed, and Q expresses the aryl group which is not permuted [ a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ].

[0232] Z101, or Z103, Z102 and Z104 of a general formula (a), in a general formula (d) Z' Or Z106 or Z107, Z105 and Z108, Z201 of a general formula (b), or Z202 and Z203, Or Z207, or Z208 and Z209, Or Z31, or Z33, Z32 and Z34 of a general formula (c), Z36, or Z38, Z35 and Z37 are expressed. Z41-Z44 Or a hydrogen atom, Expressing the aryloxy group which is not permuted [ the aryl group which is not permuted / a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or /, a permutation, or ], Q expresses the aryl group which is not permuted [ a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ].

[0233] The aryloxy group guided from the aryl group which is not permuted [ the permutation mentioned as the aralkyl radical which is not permuted / the aryl group which is not permuted / a hydrogen atom, the straight chain mentioned as an example of X1 and X2, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group a permutation, or /, a permutation, or / and an example of X1 and X2 as Z' of a general formula (d) and an example of Z41-Z44 or ] can be mentioned.

[0234] Preferably Z', and Z41-Z44 A hydrogen atom, the straight chain of carbon 1-16, Branching or an annular alkyl group, the straight chain of carbon numbers 1-16, branching, or an annular alkoxy group, The aryl group of carbon numbers 6-12, the aralkyl radical of carbon numbers 7-12, and the aryloxy group of carbon numbers 6-12 are expressed. More preferably A hydrogen atom, the straight chain of carbon numbers 1-10, branching or an annular alkoxy group, the aryl group of carbon numbers 6-10, the aralkyl radical of carbon numbers 7-10, and the aryloxy group of carbon numbers 6-10 are expressed.

[0235] As an example of a radical expressed with a general formula (d) An N-methyl-3-carbazoyl radical, an N-ethyl-3-cull BASORIRU radical, A N-n-propyl-3-carbazoyl radical, a N-iso-propyl-3-carbazoyl radical, An N-cyclohexyl-3-carbazoyl radical, An N-cyclopentyl-3-carbazoyl radical, An N-phenyl-3-carbazoyl radical, an N-(4'-phenyl phenyl)-3-carbazoyl radical, An N-methyl-6-methyl-3-carbazoyl radical, an N-ethyl-6-methyl-3-carbazoyl radical, An N-ethyl-6-methoxy-3-carbazoyl radical, an N-ethyl-6-phenoxy-3-carbazoyl radical, An N-phenyl-6-methyl-3-carbazoyl radical, an N-phenyl-6-methoxy-3-carbazoyl radical, an N-phenyl-6-phenoxy-3-carbazoyl radical, etc. can be mentioned.

[0236] As an example of Z101-Z116 of a general formula (a), a general formula (b), and a general formula (c), Z201-Z220, and Z31-Z38 For example, the straight chain mentioned as an example of X1 and X2, branching, or an annular alkyl group, The aryl group which is not permuted [ a straight chain, branching or an annular alkoxy group, a permutation, or ], The arylthio radical which is not permuted [ the aryloxy group which is not permuted / the permutation guided from the aryl group which is not permuted / the permutation mentioned as the aralkyl radical which is not permuted / a permutation or / and an example of X1 and X2 or / or, a permutation, or ] can be mentioned.

[0237] Z101-Z116, Z201-Z220, and Z31-Z38 Preferably A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-16, branching, or an annular alkyl group, The carbocyclic aromatic series radical which is not permuted [ the permutation of the straight chain of carbon numbers 1-16, branching or an annular alkoxy group, and carbon numbers 6-25,

or ], The arylthio radical which is not permuted [ the permutation of the aryloxy group which is not permuted / the permutation of the heterocycle type aromatic series radical of carbon numbers 3-25 and carbon numbers 6-25 or / and carbon numbers 6-25 or ] is expressed. More preferably A hydrogen atom, a halogen atom, the straight chain of carbon numbers 1-10, branching, or an annular alkyl group, The carbocyclic aromatic series radical which is not permuted [ the permutation of the straight chain of carbon numbers 1-10, branching or an annular alkoxy group, and carbon numbers 6-12, or ], The arylthio radical which is not permuted [ the permutation of the aryloxy group which is not permuted / the permutation of the heterocycle type aromatic series radical of carbon numbers 4-12 and carbon numbers 6-12 or / and carbon numbers 6-12 or ] is expressed.

[0238] As an example of R51-R54 in a general formula (b), the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, the straight chain mentioned as an example of X1 and X2, branching or an annular alkyl group, a permutation, or /, a permutation, or ] can be mentioned, for example.

[0239] Preferably R51-R54 A hydrogen atom, the straight chain of carbon numbers 1-16, The carbocyclic aromatic series radical which is not permuted [ the permutation of branching or an annular alkyl group and carbon numbers 6-25, or ], The aralkyl radical which is not permuted [ the permutation of the heterocycle type aromatic series radical of carbon numbers 3-25 and carbon numbers 7-25 or ] is expressed. More preferably The aralkyl radical which is not permuted [ the permutation of the aryl group which is not permuted / the permutation of a hydrogen atom, the straight chain of carbon numbers 1-10, branching or an annular alkyl group, and carbon numbers 6-12 or / and carbon numbers 7-12 or ] is expressed.

[0240] As an example of R61 and R62 in a general formula (c), the aryl group which is not permuted [ a hydrogen atom, the straight chain mentioned as an example of X1 and X2, branching or an annular alkyl group, a permutation, or ] can be mentioned, for example.

[0241] R61 and R62 express a hydrogen atom, the straight chain of carbon numbers 1-10, branching or an annular alkyl group, the carbocyclic aromatic series radical of carbon numbers 6-12, and the heterocycle type aromatic series radical of carbon numbers 3-12, and express a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, the carbocyclic aromatic series radical of carbon numbers 6-10, and the heterocycle type aromatic series radical of carbon numbers 3-10 more preferably.

[0242] In the compound expressed with a general formula (c), Ar1 expresses a divalent aromatic series radical. As an example 1, 4-phenylene group, 1, 3-phenylene group, 1, 2-phenylene group, The 3-methyl -1, 4-phenylene group, the 2-methyl -1, 4-phenylene group, 2, the 3-dimethyl -1, 4-phenylene group, 2 and 3, 5-trimethyl -1, 4-phenylene group, 2, 3, 5, 6-tetramethyl -1, 4-phenylene group, 3-ethyl -1, 4-phenylene group, 2-ethyl -1, 4-phenylene group, the 3-n-propyl -1, 4-phenylene group, The 3-isopropyl -1, 4-phenylene group, 3-n-butyl 1, 4-phenylene group, 3-sec-butyl -1, 4-phenylene group, 3-tert-butyl -1, 4-phenylene group, 2-cyclohexyl -1, 4-phenylene group, 2-cyclopentyl phenylene group, 2, the 5-dimethyl -1, 4-phenylene group, 2, 5-dimethoxy -1, 4-phenylene group, The 3-phenyl -1, 4-phenylene group, 2, 3-diphenyl -1, 4-phenylene group, 2, 3, the 5-triphenyl -1, 4-phenylene group, 2, 3 and 5, the 6-tetra-phenyl -1, 4-phenylene group, 2-(2'-naphthyl)-1, 4-phenylene group, 2-(1'-naphthyl)-1, 4-phenylene group, A - biphenylene radical, and 4 and 4'-biphenylene radical, 2 and 2', 3'-biphenylene radical, 3, a 4'-biphenylene radical, 3, the 3'-dimethyl -4, a 4'-biphenylene radical, 3, 3'-dimethoxy -4, a 4'-biphenylene radical, 3, 3'-diethoxy -4, a 4'-biphenylene radical, 3, the 3'-iso-propyl -4, a 4'-biphenylene radical, 3, 3', 5, 5'-tetramethyl - 4 4'-biphenylene radical, 3 and 3'-diphenyl - 4 and 4 - biphenylene radical, 3, 3', and 5, 5' - the - tetra-phenyl -4 and 4' - biphenylene radical - one - one -' - diphenyl ether - four - four -' - diyl -- a radical -- two -- two - isopropylidene -- diphenyl - four -' - four -' - diyl -- a radical - 1 and 1-cyclohexylidene diphenyl - 4', a 4"-diyl radical, 1, 4-naphthylene radical, 1, 5-naphthylene radical, 2,6-naphthylene, 1, 1'-binaphthalene -4, a 4'-diyl radical, A - terphenylene radical, and 9, 10-anthrylene group, 9, 9'-BIANTORASEN -10, 10'-diyl radical, 4, and 4 "3, 3'-terphenylene radical, 1, and 4-phenylene bis(3 ' - phenyl phenyl -4'-IRU) radical etc. can be mentioned.

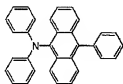
[0243] As an example of a hydrocarbon compound of having the amino substituent expressed with a general formula (a), a general formula (b), and a general formula (d), the compound (\*\* 158-185) shown below can be mentioned, for example.

[0244]

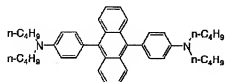
[Formula 158]

## 例示化合物

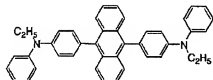
a-1



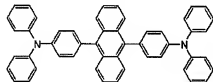
a-2



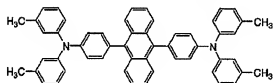
a-3



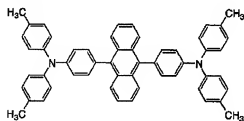
a-4



a-5

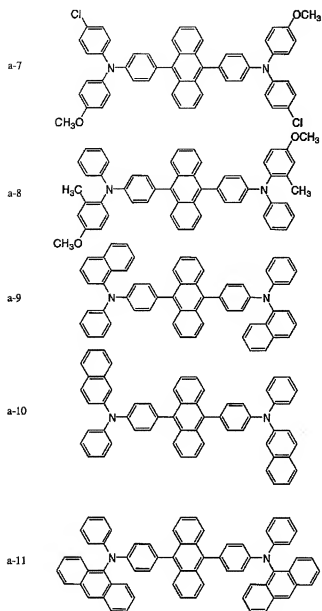


a-6



[0245]

[Formula 159]

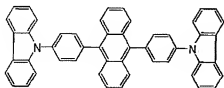


[0246]

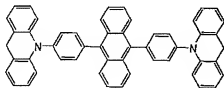
[Formula 160]



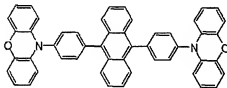
a-12



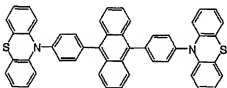
a-13



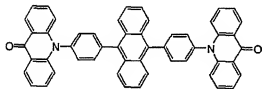
a-14



a-15

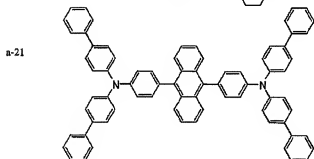
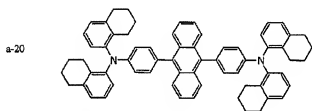
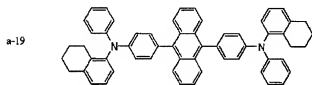
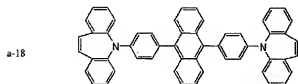
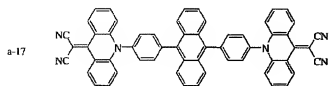


a-16



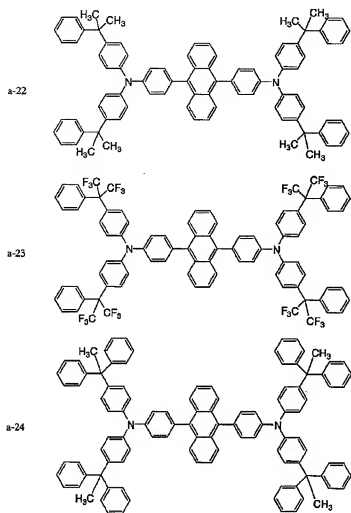
[0247]

[Formula 161]



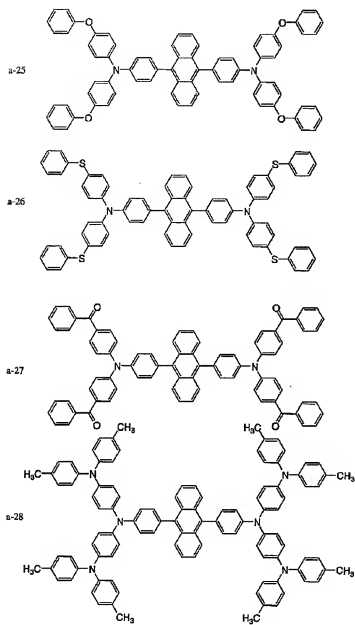
[0248]

[Formula 162]



[0249]

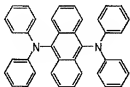
[Formula 163]



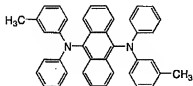
[0250]

[Formula 164]

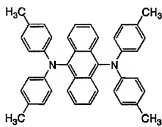
a-29



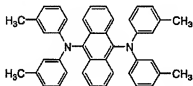
a-30



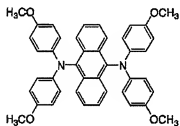
a-31



a-32

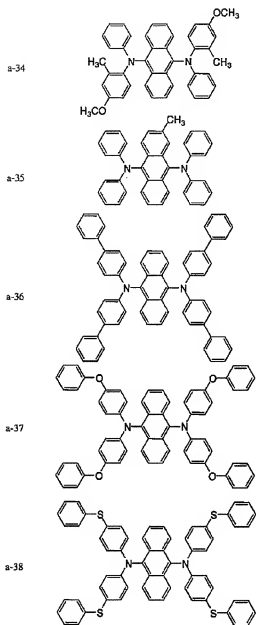


a-33



[0251]

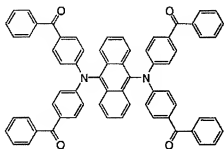
[Formula 165]



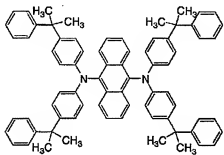
[0252]

[Formula 166]

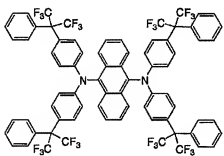
a-39



a-40



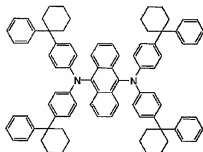
a-41



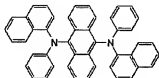
[0253]

[Formula 167]

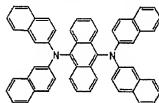
a-42



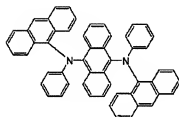
a-43



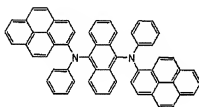
a-44



a-45



a-46



[0254]

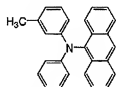
[Formula 168]



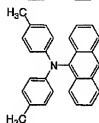
a-47



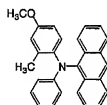
a-48



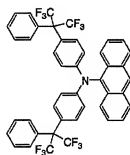
a-49



a-50



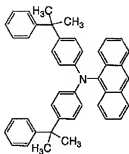
a-51



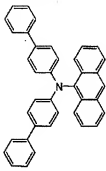
[0255]

[Formula 169]

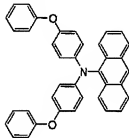
a-52



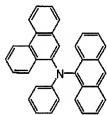
a-53



a-54

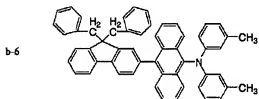
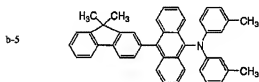
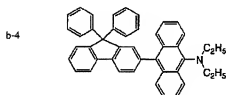
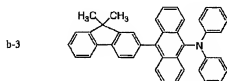
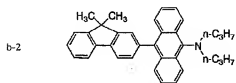
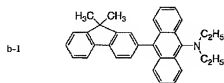


a-55



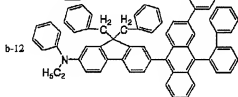
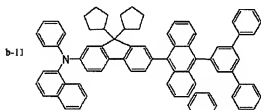
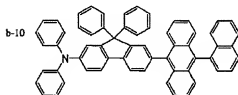
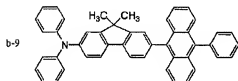
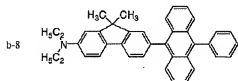
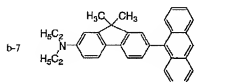
[0256]

[Formula 170]



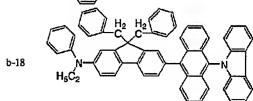
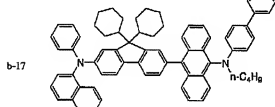
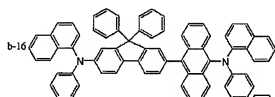
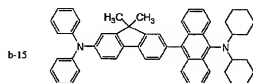
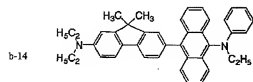
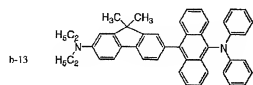
[0257]

[Formula 171]



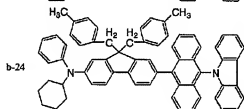
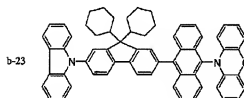
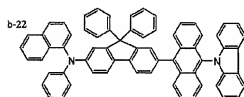
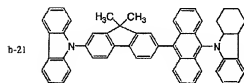
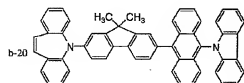
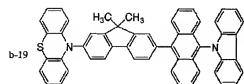
[0258]

[Formula 172]



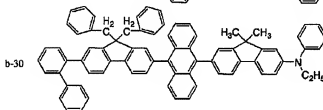
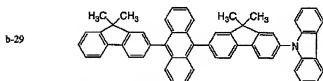
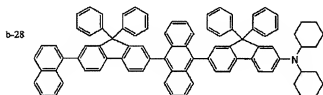
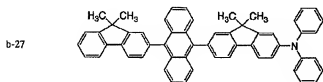
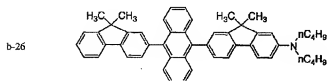
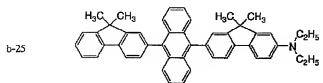
[0259]

[Formula 173]



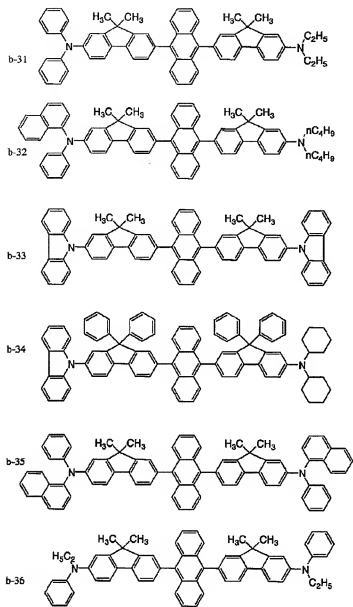
[0260]

[Formula 174]



[0261]

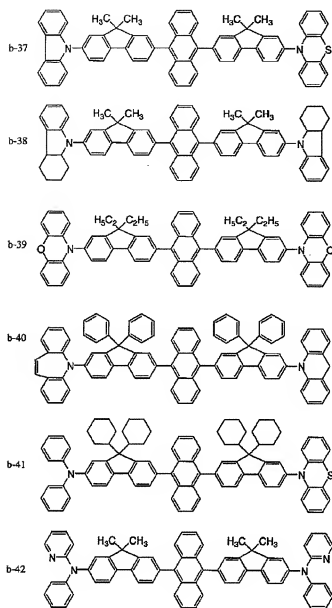
[Formula 175]



[0262]

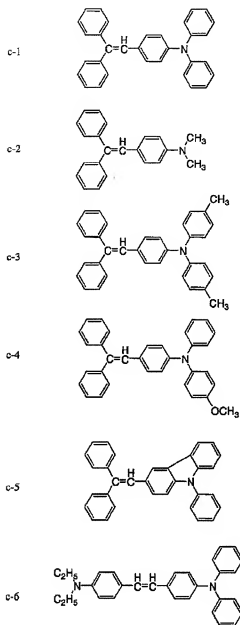
[Formula 176]





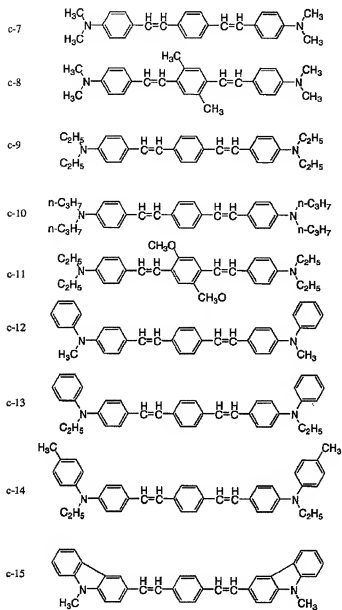
[0263]

[Formula 177]



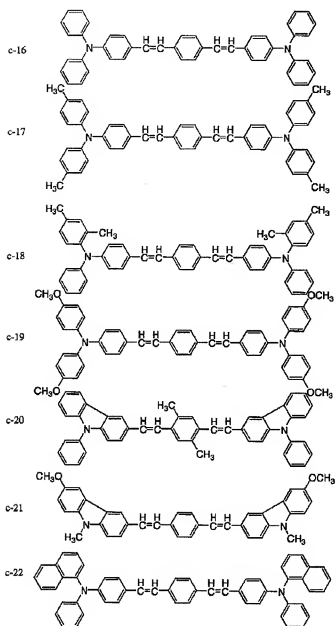
[0264]

[Formula 178]



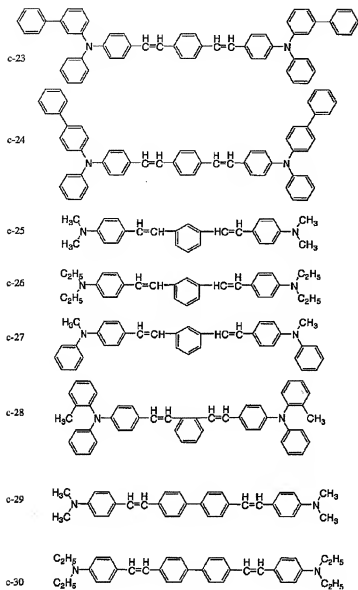
[0265]

[Formula 179]



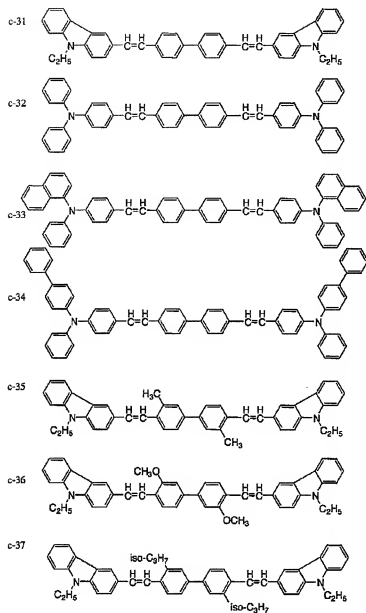
[0266]

[Formula 180]



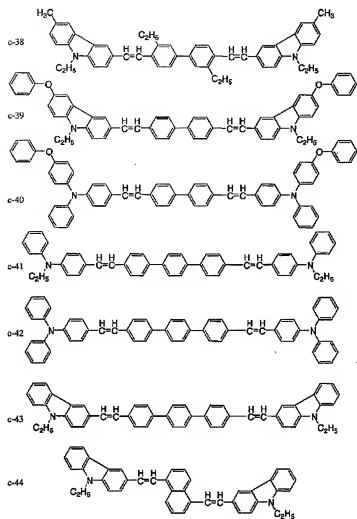
[0267]

[Formula 181]



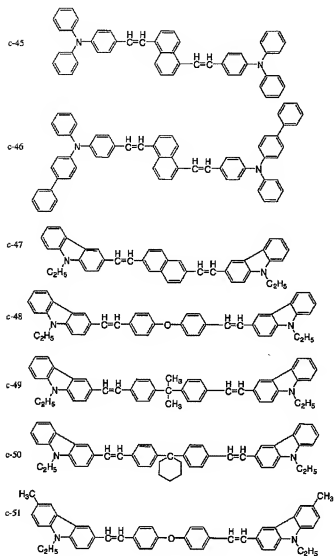
[0268]

[Formula 182]



[0269]

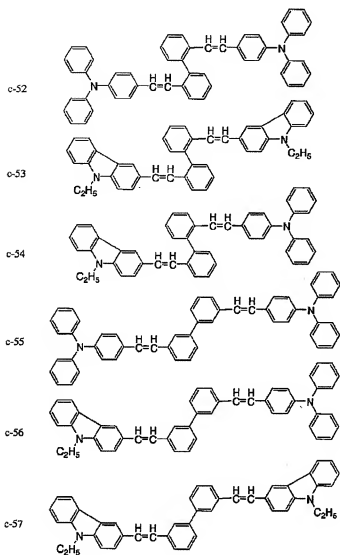
[Formula 183]



[0270]

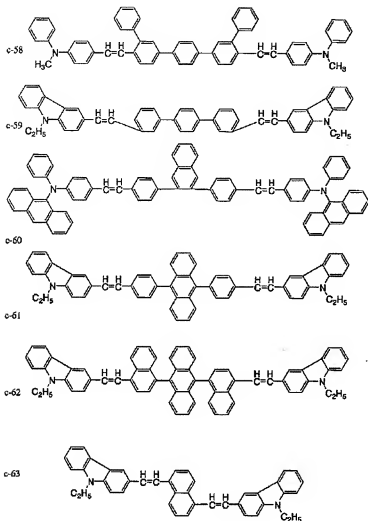
[Formula 184]





[0271]

[Formula 185]



[0272] The hydrocarbon compound which has the amino substituent expressed with a general formula (a) can be manufactured according to the approach of a publication to JP,3-111485,A, JP,9-157643,A, JP,9-268283,A, and JP,10-72579,A. The hydrocarbon compound which has the amino substituent expressed with a general formula (b) can be manufactured [ an application for patent No. 243306 / 2001 to /, and application for patent / No. 317783 / 2001 to ] according to the approach of a publication. The hydrocarbon compound which has the amino substituent expressed with a general formula (c) can be manufactured according to the approach of a publication to JP,5-163488,A, JP,5-194943,A, JP,6-1973,A, JP,6-200242,A, JP,7-138561,A, and JP,7-109450,A.

[0273] A desirable combination of the hydrocarbon compound which the anthracene ring used by the organic electroluminescence devices of this invention and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent [1] : The compound expressed with a general formula (A), and the compound expressed with a general formula (a), [2] : The compound expressed with a general formula (A), and the compound expressed with a general formula (b), [3] : The compound expressed with a general formula (A), and the compound expressed with a general formula (c), [4] : The compound expressed with a general formula (B), and the compound expressed with a general formula (a), [5] : The compound expressed with a general formula (B), and the compound expressed with a general formula (b), [6] : The compound expressed with a general formula (B), and the compound expressed with a general formula (c), [7] : The compound expressed with a general formula (C), and the compound expressed with a general formula (a), the compound expressed with a general formula (C), the compound expressed with a general formula (b), and [8]:[9] : -- the compound expressed with a general formula (C) and the compound expressed with a general formula (c) can be mentioned, and it is above [1], [3], [4], and [6] more preferably.

[0274] The organic electroluminescence devices of this invention come at least to pinch the layer containing the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly with inter-electrode [ of a couple ], and the hydrocarbon compound which has an amino substituent further.

[0275] Organic electroluminescence devices come at least to pinch the luminous layer which usually contains at least one of luminescence components in inter-electrode [ of a couple ] further. In consideration of each functional level of the hole injection of the compound used for a luminous layer and electron hole transport, electron injection, and electronic transport, the electron injection transporting bed containing the hole-injection transporting bed and/or electron injection transport component containing a hole-injection component can also be prepared according to a request.

[0276] For example, when the hole-injection function of the compound used for a luminous layer, an electron hole transport function and/or an electron injection function, and an electronic transport function are good, a luminous layer can consider as the component configuration of a mold further as a component configuration of the mold which served both as the hole-injection transporting bed and/or the electron injection transporting bed. Moreover, when the component configuration of the bilayer mold which prepared the hole-injection transporting bed in the anode plate side of a luminous layer when a luminous layer was deficient in a hole-injection function and/or an electron hole transport function, and a luminous layer are deficient in an electron injection function and/or an electronic transport function, it can consider as the component configuration of the bilayer mold which prepared the electron injection transporting bed in the cathode side of a luminous layer. It is also possible to consider as the component configuration of the three-layer mold of a configuration of to have put the luminous layer by the hole-injection transporting bed and the electron injection transporting bed furthermore.

[0277] Moreover, each layer of a hole-injection transporting bed, an electron injection transporting bed, and a luminous layer may be structure more, or may be multilayer structure, and in each layer, a hole-injection transporting bed and an electron injection transporting bed can prepare independently the layer which has an impregnation function, and the layer which has a transport function, and can also constitute it.

[0278] In the organic electroluminescence devices of this invention, as for the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent, it is desirable to use it as the constituent of a luminous layer or a constituent of a hole-injection transporting bed, and it is more desirable to use it as a constituent of a luminous layer.

[0279] In the organic electroluminescence devices of this invention, only a kind may be used for the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and they may be used together. [ two or more ]

[0280] In the organic electroluminescence devices of this invention, only a kind may be used for the hydrocarbon compound which has an amino substituent, and they may be used together. [ two or more ]

[0281] In the organic electroluminescence devices of this invention, although especially the amount of the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound used which has an amino substituent is not restricted, preferably, it is 5:1-500:1, and it is 10:1-100:1 and is 10:1-50:1 still more preferably.

[0282] In the organic electroluminescence devices of this invention, the hydrocarbon compound which can use the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly as the so-called host ingredient, and has an amino substituent can be used as the so-called dopant ingredient.

[0283] Especially as a configuration of the organic electroluminescence devices of this invention, although not limited, (A) anode plate / hole-injection transporting bed / luminous layer / electron injection transporting bed / cathode mold component ( drawing 1 ), (B) anode plate / hole-injection transporting bed / luminous layer / cathode mold component ( drawing 2 ), (C) anode plate / luminous layer / electron injection transporting bed / cathode mold component ( drawing 3 ), (D) anode plate / luminous layer / cathode mold component ( drawing 4 ), etc. can be mentioned, for example.

Furthermore, it can also consider as (E) anode plate / hole-injection transporting bed / electron injection transporting bed / luminous layer / electron injection transporting bed / cathode mold component of the form which put the luminous layer by the electron injection transporting bed ( drawing 5 ). Moreover, the component of the mold which made inter-electrode [ of a couple ] pinch a luminescence component with a gestalt further as a luminous layer as a component configuration of the mold of (D), (F) The component of the mold which it made inter-electrode [ of a couple ] pinch with the one-layer gestalt which mixed the hole-injection transport component, the luminescence component, and the electron injection component as a luminous layer ( drawing 6 ), (G) The component of the mold which it made inter-electrode [ of a couple ] pinch with the one-layer gestalt which mixed the hole-injection transport component and the luminescence component as a luminous layer ( drawing 7 ), (H) You may be any of the component ( drawing 8 ) of the mold which it made inter-electrode [ of a couple ] pinch with the one-layer gestalt which mixed the luminescence component and the electron injection component as a luminous layer.

[0284] The organic electroluminescence devices of this invention are not limited to these component configurations, and can also prepare two or more hole-injection transporting beds, luminous layers, and electron injection transporting beds in each type of component. Moreover, in each type of component, a hole-injection transporting bed can also be prepared between luminous layers, and the mixing layer of a luminescence component and an electron injection transport component can also be prepared between the mixing layer of a hole-injection transport component and a luminescence component and/or a luminous layer, and an electron injection transporting bed.

[0285] The configuration of desirable organic electroluminescence devices is (A) mold component, (B) mold component, (E) mold component, (F) mold component, or (G) mold component, and is (A) mold component, (B) mold component, or (G) mold component more preferably.

[0286] Hereafter, the component of the organic electroluminescence devices of this invention is explained to a detail. In addition, (A) anode plate / hole-injection transporting bed / luminous layer / electron injection transporting bed / cathode mold component shown in (drawing 1) as an example are taken up and explained.

[0287] (drawing 1) -- setting -- 1 -- a substrate and 2 -- in an anode plate and 3, an electron injection transporting bed and 6 show cathode, and, as for a hole-injection transporting bed and 4, 7 shows a power source, as for a luminous layer and 5.

[0288] As for the organic electroluminescence devices of this invention, being supported by the substrate 1 is desirable, especially as a substrate, although not limited, transparency thru/or a translucent substrate are desirable, and as construction material, transparency macromolecules, such as glass, such as soda lime glass and a BOROSHIRIKE toga lath, and polyester, a polycarbonate, polysulfone, polyether sulphone, polyacrylate, polymethylmethacrylate, polypropylene, and polyethylene, are mentioned. Moreover, the substrate which consists of a compound sheet which combined a translucent plastic sheet, a quartz, transparent ceramics, or these can also be used. Furthermore, the luminescent color is also controllable to a substrate combining for example, the light filter film, the color conversion film, and the dielectric reflective film.

[0289] As an anode plate 2, it is desirable to use the comparatively large metal, the alloy, or the conductive compound of a work function as an electrode material. As an electrode material used for an anode plate, gold, platinum, silver, copper, cobalt, nickel, palladium, vanadium, a tungsten, indium oxide (In 2O3), tin oxide (SnO2), a zinc oxide, ITO (indium tin oxide: Indium Tin Oxide), the poly thiophene, polypyrrole, etc. can be mentioned, for example. These electrode materials may be used independently or may be used together. [two or more] An anode plate can form these electrode materials on a substrate by approaches, such as vacuum deposition and the sputtering method.

[0290] Moreover, an anode plate may be structure much more, or may be multilayer structure. The sheet electric resistance of an anode plate is more preferably set as 5-50ohms / \*\* extent below hundreds of ohms / \*\*. Although the thickness of an anode plate is based also on the construction material of the electrode material to be used, generally about 5-1000nm is more preferably set as about 10-500nm. The hole-injection transporting bed 3 is a layer containing the compound which has the function to convey the electron hole which makes easy impregnation of the electron hole (hole) from an anode plate, and which was functioned and poured in.

[0291] At least one sort of hole-injection transporting beds of the electroluminescence devices of this invention can be formed using the compounds (for example, a phthalocyanine derivative, a thoria reel amine derivative, a thoria reel methane derivative, an oxazole derivative, a hydrazone derivative, a stilbene derivative, a pyrazoline derivative, a polysilane derivative, polyphenylene vinylene and its derivative, the poly thiophene and its derivative, poly-N-vinylcarbazole, etc.) which have a hole-injection transport function.

[0292] The organic electroluminescence devices of this invention may use the compound which may use the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino permutation machine for a hole-injection transporting bed, carrying out and which has other hole-injection transport functions. The compound which has a hole-injection transport function may be used independently, or may be used together. [two or more]

[0293] As an example of a compound of having the hole-injection transport function which can be used in the organic electroluminescence devices of this invention a thoria reel amine derivative (for example, 4 and 4' bis[ - ] [N-phenyl-N-(4"-methylphenyl) amino] biphenyl -- 4 and 4' bis[ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl, 4 and 4' bis[ - ] [N-phenyl-N-(3"-methoxyphenyl) amino] biphenyl, 4 and 4' bis[ - ] [N-phenyl-N-(1"-naphthyl) amino] biphenyl, 3 and 3' -- the - dimethyl - 4 and 4' - bis[N-phenyl-N-(3"-methylphenyl) amino] biphenyl -- A 1 and 1-bis[4'-[N and N-JI (4"-methylphenyl) amino] phenyl] cyclohexane, 9, a 10-bis[N-(4'-methylphenyl)-N-(4"-n-buthylphenyl) amino] phenanthrene, 3, 8-bis(N and N-diphenylamino)-6-phenyl phenanthridine, four - methyl - N -- N - a screw -- [ -- four -- " -- four -- " -- a screw -- [ -- N -- " -- N -- " -- JI (4-methylphenyl) -- amino -- ] -- a biphenyl - four - IRU -- ] -- an aniline -- N, N'-screw [4-(diphenylamino) phenyl]-N, N'-diphenyl - 1, 3-diaminobenzene, N, N'-screw [4-(diphenylamino) phenyl]-N, N'-diphenyl - 1, 4-diaminobenzene, 5 and 5" - screw [4- (TACHIOFEN a screw -- [ -- four - methylphenyl -- ] -- amino -- ] -- phenyl - two -- two -- " -- five -- " -- two -- " - ) 1, 3, 5-tris (diphenylamino) benzene, 4, 4', a 4"-tris (N-cull BAZORIIRU) triphenylamine, 4, 4', a 4"-tris [N and N-bis(4"-tert-butyl biphenyl-4"-IRU) amino] triphenylamine, 1, 3, 5-tris [N - (the poly thiophene and its derivative, poly-N-vinylcarbazole, its derivative of 4'-diphenylamino] benzene, etc. are more desirable.)

[0294] A luminous layer 4 is a layer containing the compound which has an electron hole and electronic impregnation functions, those transport functions, and the function to make recombination of an electron hole and an electron generate an exciton. At least one sort of luminous layers can be formed using respectively the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the hydrocarbon compound which has an amino substituent.

Moreover, the hydrocarbon compound which the anthracene ring and the fluorene ring couple directly, and the compound which has further the luminescence function other than a compound to have an amino substituent can also be used together.

[0295] as the compound which has a luminescence function here -- for example, an acridone derivative, the Quinacridone derivative, a diketopyrrolo pyrrole derivative, and a polynuclear aromatic compound -- [ -- for example Rubrene, an anthracene, tetracene, a pyrene, perylene, a chrysene, a DEKASAI crane, coronene, a tetra-phenyl cyclopentadiene, a PENTA phenyl cyclopentadiene, 9, 10-diphenyl anthracene, 9, a 10-bis(phenyl ethynyl) anthracene, A 1, 4-bis(9'-ethynyl ANTOSENIRU) benzene, 4, and 4'-bis(9''-ethynyl anthracenyl) biphenyl, a dibenzo [f, f] Jean Dino [1, 2, 3-cd:1', 2', 3'-lm] perylene derivative -- ] -- an organometallic complex -- [ -- for example Tris (8-quinolate) aluminum, bis(10-benzo[h] quinolate) beryllium, The zinc salt of 2-(2'-hydroxyphenyl) benzothiazole, the zinc salt of a 4-hydroxy acridine, the zinc salt of a 3-hydroxy flavone, the beryllium salt of a 5-hydroxy flavone, aluminum salt [ of a 5-hydroxy flavone ], and a stilbene derivative -- [ -- for example A 1, 1, 4, and 4-tetra-phenyl-1,3-butadiene, 4, and 4'-bis(2 and 2-diphenyl vinyl) biphenyl, 4 and 4' bis[ - ] [(1, 1, 2-triphenyl) ethynyl] biphenyl], Coumarin derivative (for example) A coumarin 1, a coumarin 6, a coumarin 7, a coumarin 30, a coumarin 106, a coumarin 138, a coumarin 151, a coumarin 152, a coumarin 153, a coumarin 307, a coumarin 311, a coumarin 314, a coumarin 334, a coumarin 338, a coumarin 343, A coumarin 500, a pyran derivative (for example, DCM1, DCM2), Oxazone derivative (for example, Nile red), a benzothiazole derivative, A benzoxazole derivative, a benzimidazole evening dynamic body, a pyrazine derivative, A cinnamate derivative, poly-N-vinylcarbazole, and its derivative, The poly thiophene and its derivative, polyphenylene, and its derivative, The poly fluorene and its derivative, polyphenylene vinylene, and its derivative, Poly biphenylene vinylene and its derivative, poly terphenylene vinylene and its derivative, poly naphthylene vinylene and its derivative, poly thienylene vinylene, its derivative, etc. can be mentioned. As a compound which has a luminescence function, an acridone derivative, the Quinacridone derivative, a polynuclear aromatic compound, an organometallic complex, and a stilbene derivative are desirable, and a polynuclear aromatic compound and an organometallic complex are more desirable.

[0296] When using together the compound which has luminescence functions other than the hydrocarbon compound which has the hydrocarbon compound and amino substituent which the anthracene ring and the fluorene ring couple directly, the rate of a compound of having luminescence functions other than the hydrocarbon compound which has the hydrocarbon compound and amino substituent which the anthracene ring occupied in a luminous layer and the fluorene ring couple directly is preferably adjusted to 0.001 - 20.00% of the weight.

[0297] The electron injection transporting bed 5 is a layer containing the compound which has the function to convey the electron which makes impregnation of the electron from cathode easy, and which was functioned and/or poured in.

[0298] as the compound which has the electron injection function used for an electron injection transporting bed -- an organometallic complex, an oxadiazole derivative, a triazole derivative, a triazine derivative, a perylene derivative, a quinoline derivative, a quinoxaline derivative, a diphenyl quinone derivative, and nitration full -- me -- non, a derivative, a thiopyran dioxide derivative, etc. can be mentioned. Moreover, as an organometallic complex, organic beryllium complexes, such as organic aluminium complexes, such as tris (8-quinolate) aluminum, and bis(10-benzo[h] quinolate) beryllium, the beryllium salt of a 5-hydroxy flavone, the aluminum salt of a 5-hydroxy flavone, etc. can be mentioned, for example. Preferably, it is an organic aluminium complex and is the organic aluminium complex which has 8-quinolate ligand which is not permuted [ a permutation or ]. As an organic aluminium complex which has 8-quinolilato ligand which is not permuted [ a permutation or ], the compound expressed with a general formula (a) - a general formula (c) can be mentioned, for example.

[0299] (Q)3-Al(a)

(Q expresses among a formula 8-quinolate ligand which is not permuted [ a permutation or ])

(Q)2-Al-O-L'(b)

(Q expresses among a formula 8-quinolate ligand which is not permuted [ a permutation or ], O-L' expresses a phenolate ligand, and L' expresses the hydrocarbon group of the carbon numbers 6-24 which have a phenyl group)

(Q)2-Al-O-Al-(Q)2 (c)

(Q expresses among a formula 8-quinolate ligand which is not permuted [ a permutation or ])

[0300] As an example of an organic aluminium complex of having 8-quinolate ligand which is not permuted [ a permutation or ] For example, tris (8-quinolate) aluminum, tris (4-methyl-8-quinolate) aluminum, Tris (5-methyl-8-quinolate) aluminum, tris (3, 4-dimethyl-8-quinolate) aluminum, Tris (4, 5-dimethyl-8-quinolate) aluminum, tris (4, 6-dimethyl-8-quinolate) aluminum, Bis(2-methyl-8-quinolate) (phenolate) aluminum, Bis(2-methyl-8-quinolate) (2-methyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (3-methyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (4-methyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2-phenyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (3-phenyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (4-phenyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2, 3-dimethyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2, 6-dimethyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (3, 4-dimethyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (3, 5-dimethyl phenolate) aluminum, Bis(2-methyl-8-quinolate)

(3, 5-G tert-butyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2, 6-diphenyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2, 4, 6-triphenyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2, 4, 6-trimethyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2, 4, 5, 6-tetramethyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (1-naphthyl phenolate) aluminum, Bis(2-methyl-8-quinolate) (2-naphthyl phenolate) aluminum, Bis(2, 4-dimethyl-8-quinolate) (2-phenyl phenolate) aluminum, Bis(2, 4-dimethyl-8-quinolate) (3-phenyl phenolate) aluminum, Bis(2, 4-dimethyl-8-quinolate) (4-phenyl phenolate) aluminum, Bis(2, 4-dimethyl-8-quinolate) (3, 5-dimethyl phenolate) aluminum, Bis(2, 4-dimethyl-8-quinolate) (3, 5-G tert-butyl phenolate) aluminum, Bis(2-methyl-8-quinolate) aluminum-mu-oxo-bis(2-methyl-8-quinolate) aluminum, Bis(2, 4-dimethyl-8-quinolate) aluminum-mu-oxo-bis(2, 4-dimethyl-8-quinolate) aluminum, Bis(2-methyl-4-ethyl-8-quinolate) aluminum-mu-oxo-bis(2-methyl-4-ethyl-8-quinolate) aluminum, Bis(2-methyl-4-methoxy-8-quinolate) aluminum-mu-oxo-bis(2-methyl-4-methoxy-8-quinolate) aluminum, Bis(2-methyl-5-cyano-8-quinolate) aluminum-mu-oxo-bis(2-methyl-5-cyano-8-quinolate) aluminum, Bis(2-methyl-5-trifluoromethyl-8-quinolate) aluminum-mu-oxo-bis(2-methyl-5-trifluoromethyl-8-quinolate) aluminum can be mentioned.

[0301] The compound which has an electron injection function may be used independently, and may be used together.

[two or more] As cathode 6, it is desirable to use a metal with a comparatively small work function, an alloy, or a conductive compound as an electrode material. As an electrode material used for cathode, a lithium and lithium-indium alloy, sodium, and sodium-potassium alloy, calcium, magnesium, and magnesium-silver alloy, a MAGNESHIMU-indium alloy, an indium, a ruthenium, titanium, manganese, an yttrium, aluminum, an aluminum-lithium alloy, an aluminum-calcium alloy, an aluminum magnesium alloy, and graphite \*\* can be mentioned, for example. These electrode materials may be used independently and may be used together. [two or more]

[0302] Cathode can form these electrode materials on an electron injection transporting bed by vacuum deposition, the sputtering method, ion vacuum deposition, the ion plating method, and the ionized cluster beam method. Moreover, cathode may be structure much more and may be multilayer structure. As for the sheet electric resistance of cathode, it is desirable to carry out to below hundreds of ohms / \*\*. Although the thickness of cathode is based also on the electrode material to be used, it is usually preferably set to 10-500nm 5-1000nm. In order to take out luminescence of the organic electroluminescence devices of this invention with sufficient high rate, transparency thru/or the translucent thing of one [at least] electrode of an anode plate or cathode are desirable, and it is desirable to set up the ingredient of an anode plate or cathode and thickness generally, so that the permeability of luminescence light may become 70% or more.

[0303] Moreover, the organic electroluminescence devices of this invention may contain singlet oxygen KUNCHA in inside further, even if there are few hole-injection transporting beds, luminous layers, and electron injection transporting beds. Especially as a singlet oxygen quencher, although not limited, rubrene, a nickel complex, and diphenyl iso benzofuran are mentioned, and it is rubrene preferably, for example.

[0304] Especially as a layer which the singlet oxygen quencher contains, although not limited, it is a luminous layer or a hole-injection transporting bed, and is a hole-injection transporting bed more preferably. In addition, when making a hole-injection transporting bed contain a singlet oxygen quencher, homogeneity may be made to contain in a hole-injection transporting bed, and you may make it contain near the layer (for example, a luminous layer, the electron injection transporting bed which has a luminescence function) which adjoins a hole-injection transporting bed.

[0305] 0.01- of the amount of whole which constitutes the layer (for example, hole-injection transporting bed) to contain as a content of a singlet oxygen quencher -- it is 0.1 - 20 % of the weight more preferably 0.05 to 30% of the weight 50% of the weight.

[0306] Especially concerning the formation approach of a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, it is not limited and vacuum evaporation technique, ionization vacuum deposition, and the solution applying method (for example, a spin coat method, the cast method, a dip coating method, the bar coat method, the roll coat method, a Langmuir-Blodgett's technique, the ink jet method) can be used. When forming each class, such as a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, with a vacuum deposition method, they are the conditions of vacuum deposition. Although not limited especially, it is usually desirable under the vacuum below 10-5Torr extent to carry out with the evaporation rate of 0.005 - 50 nm/sec extent at the boat temperature (source temperature of vacuum evaporation) of about 50-500 degrees C and the substrate temperature of about -50-300 degrees C. In this case, as for each class, such as a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, forming continuously under a vacuum is desirable. It becomes possible by forming continuously to manufacture organic electroluminescence devices excellent in many properties. When forming each class, such as a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, with a vacuum deposition method using two or more compounds, it is desirable that carry out temperature control of each boat into which the compound was put, and it carries out vapor codeposition according to an individual.

[0307] When you form each class by the solution applying method, a solvent is dissolved or distributed and let the component which forms each class, its component, binder resin, etc. be coating liquid. as a solvent -- an organic solvent (a hexane, an octane, Deccan, and toluene --) Hydrocarbon system solvents, such as a xylene, ethylbenzene, and 1-

methylnaphthalene, Ketone solvent, such as an acetone, a methyl ethyl ketone, methyl isobutyl ketone, and a cyclohexanone, Dichloromethane, chloroform, tetrachloromethane, a dichloroethane, Trichloroethane, tetrachloroethane, a chlorobenzene, a dichlorobenzene, Halogenated hydrocarbon system solvents, such as chloro toluene, ethyl acetate, butyl acetate, Ester solvent, such as amyl acetate and ethyl lactate, a methanol, propanol, A butanol, a pentanol, a hexanol, a cyclohexanol, methyl cellosolve, Alcoholic solvent, such as ethylcellosolve and ethylene glycol, dibutyl ether, Ether system solvents, such as a tetrahydrofuran, dioxane, dimethoxyethane, and an anisole, Polar solvents, such as N,N-dimethylformamide, N,N-dimethylacetamide, a 1-methyl-2-pyrrolidone, 1,3-dimethyl-2-imidazolidinone, and dimethyl sulfoxide, and water can be mentioned. A solvent may be used independently and may be used together. [ two or more ] When making a solvent distribute the component of each class of a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, the approach of distributing in the shape of a particle as the distributed approach using a ball mill, a sand mill, a paint shaker, attritor, a homogenizer, etc. can be used.

[0308] moreover, as binder resin which can be used for each class, such as a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed Poly-N-vinylcarbazole, the poly ARI rate, polystyrene, Polyester, a polysiloxane, polymethylmethacrylate, polymethyl acrylate, A polyether, a polycarbonate, a polyamide, polyimide, polyamidoimide, Poly paraxylene, polyethylene, polyphenylene oxide, polyether sulphone, High molecular compounds, such as the poly aniline and its derivative, the poly thiophene and its derivative, polyphenylene vinylene and its derivative, the poly fluorene and its derivative, poly thiophene vinylene, and its derivative, can be mentioned. Binder resin may be used independently and may be used together. [ two or more ] Although especially the concentration of coating liquid is not limited, it can be set as the density range suitable for producing desired thickness by the applying method to enforce, and is usually preferably set up to 1 - 30% of the weight 0.1 to 50% of the weight. When using binder resin, although especially the amount used is not limited, the content (receiving the total amount of each component, in forming the component of a mold further) of binder resin usually uses it preferably five to 99.9% of the weight to the total amount of the component which forms each class, such as a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, and binder resin so that it may become 10 - 99 % of the weight.

[0309] Although especially the thickness of each class, such as a hole-injection transporting bed, a luminous layer, and an electron injection transporting bed, is not limited, it may usually be 5nm - 5 micrometers.

[0310] Moreover, the organic electroluminescence devices of this invention produced on condition that the above are the objects which prevent contact with oxygen, moisture, etc., a protective layer (closure layer) can be prepared, and can enclose a component into an inactive substance (for example, paraffin, a liquid paraffin, a silicone oil, a fluorocarbon oil, a zeolite content fluorocarbon oil), and can protect it. as the ingredient used for a protective layer -- for example, organic polymeric materials (for example, a fluoro resin, an epoxy resin, silicone resin, epoxy silicone resin, polystyrene, polyester, a polycarbonate, a polyamide, polyimide, polyamidoimide, poly paraxylene, polyethylene, polyphenylene oxide) and an inorganic material (for example, diamond thin film, amorphous silica, and electric insulation glass, a metallic oxide, a metal nitride, metallic carbide, metallic sulfide) -- a photo-setting resin can be mentioned further. The ingredient used for a protective layer may be used independently, and may be used together. [ two or more ] A protective layer may be structure much more, and may be multilayer structure.

[0311] Moreover, the organic electroluminescence devices of this invention can also prepare the metallic-oxide film (for example, aluminum-oxide film) and the metal fluoride film in an electrode as a protective coat.

[0312] The organic electroluminescence devices of this invention can also prepare a volume phase (interlayer) on the surface of an anode plate. As construction material of a volume phase, an organic phosphorous compound, polysilane, an aromatic amine derivative, a phthalocyanine derivative, etc. can be mentioned. Furthermore, an electrode, for example, an anode plate, can also process and use the front face with an acid, ammonia/hydrogen peroxide, or the plasma.

[0313] The organic electroluminescence devices of this invention can usually be used also as a component of an alternating current actuation mold, although it can be used as a component of a direct-current actuation mold. Moreover, the organic electroluminescence devices of this invention may be passive actuation molds, such as a segmental die and a simple matrix actuation mold, and may be active actuation molds, such as a TFT (thin film transistor) mold and an MIM (metal-in SURETA-metal) mold. Driver voltages are usually 2-30V. The organic electroluminescence devices of this invention can be used for the panel mold light source (for example, back lights, such as a clock and a liquid crystal panel), various kinds of light emitting devices (for example, alternative of light emitting devices, such as LED), various kinds of display devices [for example, an information-display component (a personal computer monitor, a cellular phone and the display device for personal digital assistants)], various kinds of indicators, various kinds of sensors, etc.

[0314]

[Example] Although an example is given and this invention is hereafter explained further to a detail, this invention is not limited to the following examples.

[0315] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 1:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean

(product made from fruity chemistry), ultrapure water, an acetone, and ethanol. After drying this substrate using nitrogen gas and carrying out UV / ozone washing further, it fixed to the substrate electrode holder of vacuum evaporation equipment, and the vacuum evaporation tub was decompressed to 3x10<sup>-6</sup>Torr. first, an ITO transparent electrode top -- N and N' - diphenyl-N and N' - JI (1'-naphthyl) -4 and 4' -- the - diamino -1 and 1' - biphenyl was vapor-deposited in thickness of 75nm by evaporation rate 0.2 nm/sec, and the hole-injection transporting bed was formed. Next, vapor codeposition (weight ratio 93:7) of the compound of the instantiation compound A -23 and the compound of the instantiation compound a-31 was carried out to the thickness of 40nm by evaporation rate 0.2 nm/sec on the hole-injection transporting bed, further, tris (eight quinololinol) aluminum was vapor-deposited in thickness of 50nm by evaporation rate 0.2 nm/sec, and the electron injection transporting bed was formed. Moreover, vapor codeposition (weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporation was carried out, with the reduced pressure condition of a vacuum evaporation tub maintained. Direct current voltage was impressed to the produced organic electroluminescence devices, and continuation actuation was carried out by the constant current consistency of 10 mA/cm<sup>2</sup> under the room temperature and the desiccation ambient atmosphere. In early stages, blue luminescence of 5.6V and brightness 890 cd/m<sup>2</sup> was checked. The half-life of brightness was 2100 hours.

[0316] Examples 2-15 : Formation of a luminous layer is faced in the production example 1 of organic electroluminescence devices. Instead of using the compound of the instantiation compound A -23, and the compound of the instantiation compound a-31 by the weight ratio 93:7 instantiation compound A - The compound of 38, and the compound of b-33 by the weight ratio 10:1 The compound of the compound A -54 of an activity (example 2) and an instantiation compound, The compound of the instantiation compound c-15 by the weight ratio 93:7 The compound of an activity (example 3) and the instantiation compound B-1, The compound of the instantiation compound a-12 by the weight ratio 10:1 The compound of an activity (example 4) and the instantiation compound B-24, The compound of the instantiation compound a-40 by the weight ratio 10:1 The compound of an activity (example 5) and the instantiation compound B-21, The compound of the instantiation compound b-18 by the weight ratio 94:6 The compound of an activity (example 6) and the instantiation compound B-25, The compound of the instantiation compound c-35 (example 7) and the instantiation compound C-28, The compound of the instantiation compound a-2 by the weight ratio 93:7 The compound of an activity (example 8) and the instantiation compound C-44, The compound of the instantiation compound b-16 by the weight ratio 10:1 The compound of an activity (example 9) and the instantiation compound C-1, The compound of the instantiation compound c-31 by the weight ratio 93:7 The compound of an activity (example 10) and the instantiation compound D-19, The compound of the instantiation compound a-46 by the weight ratio 10:1 The compound of an activity (example 11) and the instantiation compound E -11, The compound of the instantiation compound c-39 by the weight ratio 94:6 The compound of an activity (example 12) and the instantiation compound E -16, The compound of the instantiation compound b-3 by the weight ratio 10:1 The compound of an activity (example 13) and the instantiation compound E -17, According to actuation of a publication, organic electroluminescence devices were produced in the example 1 except having carried out the compound of the instantiation compound b-29 by the weight ratio 10:1, and having used the compound of an activity (example 14) and the instantiation compound F -24, and the instantiation compound c-34 by the weight ratio 93:7 (example 15). From each component, luminescence of a blue - bluish green color was checked. Furthermore the property was investigated and it was shown in the result (table 1 (the 1st table)).

[0317] In example of comparison 1 example 1, organic electroluminescence devices were produced according to actuation of a publication in the example 1 except having used the 4 and 4'-bis(2"2"-diphenyl vinyl) biphenyl instead of using the compound of the instantiation compound A -23, and the compound of the instantiation compound a-31 by the weight ratio 93:7 on the occasion of formation of a luminous layer. Blue luminescence was checked from the component. Furthermore the property was investigated and it was shown in the result (table 1 (the 1st table)).

[0318] In example of comparison 2 example 1, organic electroluminescence devices were produced according to actuation of a publication in the example 1 except having used the 4 and 4'-bis(2"2"-diphenyl vinyl) biphenyl and the compound of the instantiation compound c-31 by the weight ratio 93:7 instead of using the compound of the instantiation compound A -23, and the compound of the instantiation compound a-31 by the weight ratio 93:7 on the occasion of formation of a luminous layer. Blue luminescence was checked from the component. Furthermore the property was investigated and it was shown in the result (table 1 (the 1st table)).

[0319] In example of comparison 3 example 1, organic electroluminescence devices were created according to actuation of a publication in the example 1 except having used 9 and 10-diphenyl anthracene instead of using the compound of the instantiation compound A -23, and the compound of the instantiation compound a-31 by the weight ratio 93:7 on the occasion of formation of a luminous layer. Blue luminescence was checked from the component. Furthermore the property was investigated and it was shown in the result (table 1 (the 1st table)).

[0320]

[A table 1]



第1表

有機電界発光素子	初期特性 (25℃)		半減期 (25℃) (hr)
	輝度 (cd/cm <sup>2</sup> )	電圧 (V)	
実施例2	870	6.0	2300
実施例3	930	6.5	2500
実施例4	950	6.1	2400
実施例5	890	6.4	1800
実施例6	850	6.2	2200
実施例7	940	6.1	2300
実施例8	790	5.9	2400
実施例9	890	6.4	2600
実施例10	950	6.1	2400
実施例11	910	6.4	1900
実施例12	890	5.9	2100
実施例13	790	6.4	2400
実施例14	880	6.9	2200
実施例15	940	6.0	2300
比較例1	300	7.4	120
比較例2	450	7.1	350
比較例3	410	6.9	720

[0321] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 16:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean (product made from fruity chemistry), ultrapure water, an acetone, and ethanol. After drying this substrate using nitrogen gas and carrying out UV / ozone washing further, it fixed to the substrate electrode holder of vacuum evaporatono equipment, and the vacuum evaporatono tub was decompressed to 3x10<sup>-6</sup>Torr. First, on the ITO transparent electrode, Pori (a thiophene -2, 5-diyl) was vapor-deposited in thickness of 20nm by evaporation rate 0.1 nm/sec, and the 1st hole-injection transporting bed was formed. subsequently, N and N' - diphenyl-N and N' - JI (1'-naphthyl) -4 and 4' -- the - diamino -1 and 1' - biphenyl was vapor-deposited in thickness of 55nm by evaporation rate 0.2 nm/sec, and the 2nd hole-injection transporting bed was formed. Next, on the hole-injection transporting bed, the compound of the instantiation compound C-14 and the compound of the instantiation compound a-45 were vapor-deposited by vapor codeposition (weight ratio 10:1) in thickness of 65nm by evaporation rate 0.2 nm/sec, and the luminous layer was formed. Then, further, tris (8-quinolate) aluminum was vapor-deposited in thickness of 50nm by evaporation rate 0.2 nm/sec, and the luminous layer which has an electron injection transporting bed was formed. Furthermore, on it, vapor codeposition (weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporatono was carried out, with the reduced pressure condition of a vacuum evaporatono tub maintained. Direct current voltage was impressed to the produced organic electroluminescence devices, and continuation actuation was carried out by the constant current consistency of 10 mA/cm<sup>2</sup> under the desiccation ambient atmosphere. In early stages, luminescence of the bluish green color of 6.0V and brightness 810 cd/m<sup>2</sup> was checked. The half-life of brightness was 1750 hours.

[0322] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 17:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean (product made from fruity chemistry), ultrapure water, an acetone, and ethanol. After drying this substrate using nitrogen gas and carrying out UV / ozone washing further, it fixed to the substrate electrode holder of vacuum evaporatono equipment, and the vacuum evaporatono tub was decompressed to 3x10<sup>-6</sup>Torr. First, on the ITO transparent electrode, 4, 4', and a 4"-tris [N-(3"-methylphenyl)-N-phenylamino] triphenylamine were vapor-deposited in thickness of 50nm by evaporation rate 0.1 nm/sec, and the 1st hole-injection transporting bed was formed. subsequently, N, N, N', and N' -- the - tetrapod (1'-naphthyl) -4 and 4' -- the - diamino -1 and 1' - biphenyl was vapor-deposited in thickness of 20nm by evaporation rate 0.2 nm/sec, and the 2nd hole-injection transporting bed was formed. Subsequently, on it, vapor codeposition (weight ratio 10:1:1) of the compound of the instantiation compound H-1, the compound of the instantiation compound a-43, and the rubrene was carried out to the thickness of 30nm by evaporation rate 0.2 nm/sec from a different source of vacuum evaporatono, and the luminous layer was formed. Subsequently, on it, tris (8-quinolate) aluminum was vapor-deposited in thickness of 50nm by evaporation rate 0.2 nm/sec, and the luminous layer which has an electron injection transporting bed was formed. Furthermore, on it, vapor codeposition (weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and

organic electroluminescence devices were produced. Direct current voltage was impressed to the produced organic electroluminescence devices, and continuation actuation was carried out by the constant current consistency of 10 mA/cm<sup>2</sup> under the desiccation ambient atmosphere. In early stages, luminescence of the yellow of 5.8V and brightness 820 cd/m<sup>2</sup> was checked. The half-life of brightness was 2400 hours.

[0323] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 18:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean (product made from fruity chemistry), ultrapure water, an acetone, and ethanol. After drying this substrate using nitrogen gas and carrying out UV / ozone washing further, it fixed to the substrate electrode holder of vacuum evaporationo equipment, and the vacuum evaporationo tub was decompressed to 3x10<sup>-6</sup>Torr. First, on the ITO transparent electrode, Pori (a thiophene -2, 5-diyl) was vapor-deposited in thickness of 20nm by evaporation rate 0.1 nm/sec, and the 1st hole-injection transporting bed was formed. After returning a vacuum evaporationo tub to the bottom of atmospheric pressure, the vacuum evaporationo tub was again decompressed to 3x10<sup>-6</sup>Torr. Subsequently, vapor codeposition (weight ratio 10:1:1) of the compound of the instantiation compound C-1, the compound of the instantiation compound a-9, and the rubrene was carried out to the thickness of 55nm by evaporation rate 0.2 nm/sec from a different source of vacuum evaporationo, and the luminous layer which has the 2nd hole-injection transporting bed was formed. With [ next ] the reduced pressure condition maintained, on it, tris (8-quinolate) aluminum was vapor-deposited in thickness of 50nm by evaporation rate 0.2 nm/sec, and the electron injection transporting bed was formed. With the reduced pressure condition maintained, further, on it, vapor codeposition (weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and organic electroluminescence devices were produced. Direct current voltage was impressed to the produced organic electroluminescence devices, and continuation actuation was carried out by the constant current consistency of 10 mA/cm<sup>2</sup> under the desiccation ambient atmosphere. In early stages, luminescence of the yellow of 6.8V and brightness 910 cd/m<sup>2</sup> was checked. The half-life of brightness was 2200 hours.

[0324] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 19:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean (product made from fruity chemistry), ultrapure water, an acetone, and ethanol. After drying this substrate using nitrogen gas and carrying out UV / ozone washing further, it fixed to the substrate electrode holder of vacuum evaporationo equipment, and the vacuum evaporationo tub was decompressed to 3x10<sup>-6</sup>Torr. first, an ITO transparent electrode top -- N, N, N', and N' -- the - tetrapod (1'-naphthyl) -4 and 4' -- the - diamino -1 and 1' - biphenyl was vapor-deposited in thickness of 20nm by evaporation rate 0.1 nm/sec, and the 1st hole-injection transporting bed was formed. After returning a vacuum evaporationo tub to the bottom of atmospheric pressure, the vacuum evaporationo tub was again decompressed to 3x10<sup>-6</sup>Torr. Subsequently, vapor codeposition (weight ratio 90:5:5) of the compound of the instantiation compound I-1, the compound of the instantiation compound a-4, and 2, 5, 8 and 11-tetra-tert-butyl perylene was carried out to the thickness of 55nm by evaporation rate 0.2 nm/sec from a different source of vacuum evaporationo, and the luminous layer which has the 2nd hole-injection transporting bed was formed. Next, on it, tris (8-quinolate) aluminum was vapor-deposited in thickness of 50nm by evaporation rate 0.2 nm/sec, and the electron injection transporting bed was formed. Furthermore, on it, vapor codeposition (weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporationo was carried out, with the reduced pressure condition of a vacuum evaporationo tub maintained. Direct-current-voltage impression was carried out at the produced organic electroluminescence devices, and continuation actuation was carried out by the constant current consistency of 10 mA/cm<sup>2</sup> under the desiccation ambient atmosphere. In early stages, luminescence of the yellow of 5.8V and brightness 890 cd/m<sup>2</sup> was checked. The half-life of brightness was 2400 hours.

[0325] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 20:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean (product made from fruity chemistry), ultrapure water, an acetone, and ethanol. This substrate was dried using nitrogen gas and UV / ozone washing was carried out further. next, the bottom of nitrogen-gas-atmosphere mind -- an ITO transparent electrode top -- a polycarbonate (weight average molecular weight 39000), N, and N' - diphenyl-N and N' - II (1'-naphthyl) -4 and 4' -- the - diamino -1 and 1' -- the 40nm hole-injection transporting bed was formed with the spin coat method using the 3-% of the weight dehydration dichloroethane solution which contains - biphenyl at a rate of the weight ratio 100:50. Next, the glass substrate which has this hole-injection transporting bed was fixed to the substrate electrode holder of vacuum evaporationo equipment, and the vacuum evaporationo layer was decompressed to 3x10<sup>-6</sup>Torr. Next, on it, vapor codeposition (weight ratio: 10:1) of the compound of the instantiation compound D-19 and the compound of the instantiation compound b-11 was carried out to the thickness of 35nm by evaporation rate 0.2 nm/sec, and the luminous layer was formed. Furthermore, on it, tris (8-quinolate) aluminum was vapor-deposited in thickness of 50nm by evaporation rate 0.2 nm/sec, and the electron injection transporting bed was formed. Furthermore, on it, vapor codeposition

(weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and organic electroluminescence devices were produced. When the direct current voltage of 10V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, the current of 89 mA/cm<sup>2</sup> flowed. Luminescence of the bluish green color of brightness 1290 cd/m<sup>2</sup> was checked. The half-life of brightness was 740 hours.

[0326] the glass substrate which has an ITO transparent electrode (anode plate) with a production thickness [ of Example 21:organic electroluminescence devices ] of 200nm -- neutral detergent and SEMIKO -- it cleaned ultrasonically using clean (product made from fruity chemistry), ultrapure water, an acetone, and ethanol. This substrate was dried using nitrogen gas and UV / ozone washing was carried out further. Next, the 100nm luminous layer was formed with the spin coat method the bottom of nitrogen-gas-atmosphere mind, and on the ITO transparent electrode using the compound of polymethylmethacrylate (weight average molecular weight 25000) and the instantiation compound C-14, the compound of the instantiation compound c-31, and the 3-% of the weight dehydration dichloroethane solution that contains tris (8-quinolate) aluminum at a rate of the weight ratio 100:50:0.5:10, respectively. Next, the glass substrate which has this luminous layer was fixed to the substrate electrode holder of vacuum evaporationo equipment, and the vacuum evaporationo layer was decompressed to 3x10<sup>-6</sup>Torr. On the luminous layer, vapor codeposition (weight ratio 10:1) of magnesium and the silver was carried out to the thickness of 200nm by evaporation rate 0.2 nm/sec as cathode, it considered as cathode, and organic electroluminescence devices were produced. When the direct current voltage of 15V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, the current of 89 mA/cm<sup>2</sup> flowed. Luminescence of the bluish green color of brightness 820 cd/m<sup>2</sup> was checked. The half-life of brightness was 750 hours.

[0327]

[Effect of the Invention] Luminescence brightness was high, the luminescence life was still longer, and this invention enabled it to offer organic electroluminescence devices excellent in endurance.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

- [Drawing 1] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 2] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 3] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 4] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 5] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 6] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 7] It is the cross-section schematic diagram of an example of organic electroluminescence devices.  
[Drawing 8] It is the cross-section schematic diagram of an example of organic electroluminescence devices.

[Description of Notations]

- 1: Substrate  
2: Anode plate  
3: Hole-injection transporting bed  
3a: Hole-injection transport component  
4: Luminous layer  
4a: Luminescence component  
5: Electron injection transporting bed  
5": Electron injection transporting bed  
5a: Electron injection transport component  
6: Cathode  
7: Power source

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[Translation done.]

\* NOTICES \*

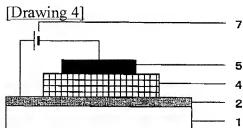
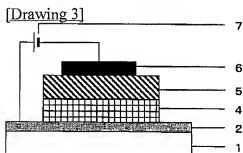
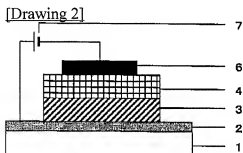
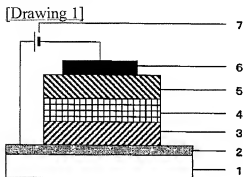
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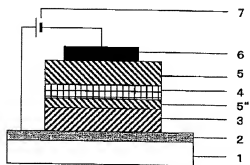
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DRAWINGS

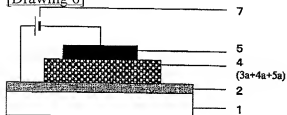
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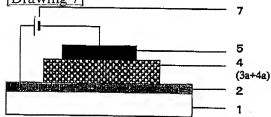
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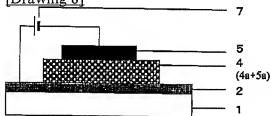
[Drawing 6]



[Drawing 7]



[Drawing 8]



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[Translation done.]